FOOD INDUSTRIES

manufacturing and processing

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What Shall Be Done With Time?

IN VAIN have we sought the prophet who can answer the question that recurs so frequently in our conversations with manufacturers, not only of foods but of other goods. Those who make a business of appraising the economic conditions of the day give various degrees of deviation from the normal, but, though they uniformly agree that the condition of trade is slightly below what it ought to be in that vague state of things called normal, we feel that something is back of all this unsatisfactory condition that we are unconsciously evading.

¶ COMMERCE, manufacturing, and business in general are experiencing a world-wide distress that is more or less acute. Even France which had a slight shortage of labor only a few months ago now has an unemployment problem.

¶ CORRECTIVE MEASURES such as the creation of the Federal Farm Board, tariff revision, studies of distributing efficiency that we are applying to our problems in the United States appear to be but temporary solutions of another problem of a scope so large that we are unable to comprehend it and that many will fear to face. This country is not alone in its troubles, for Britain, Germany, Brazil, Chile, and Italy have problems that are strangely like our own in many ways.

¶ IN THE LARGER SENSE, man's increasing ingenuity in mechanical and agricultural production tends to create a byproduct of which little thought is now taken: time. Call it leisure if you choose, but in the end it is time to be free from work. Yet those by whose skill this freedom from constant work is acquired do not utilize it themselves. Instead they pass it on freely to others, and the net result is the so-called technological unemployment.

¶ CREATIVE SPIRIT is so strong in man that, given the opportunity to devise better and cheaper ways of doing things, he continues his labors in this direction, but those who are most successful in this line of endeavor seldom, if ever, accept for themselves the leisure they make possible. On the contrary, it is given to others—to men who often are quite unable, either by mental endowments or worldly goods—to utilize it and still exist.

¶ THE CONDITION exists today in which a sizable percentage of our population could live on the labors of the others who work. All that is lacking is the money with which to purchase the production of the more able portion of the population, and they cannot get that money while they are idle.

¶ IF THE COMMISSION is appointed by President Hoover that he has stated he hopes to set at the task of inquiring into the causes underlying the stock market crash, we urge that the commission also place on its agenda the study of the question of the leisure-time byproduct of man's technical skill.

EDITORIALS

JUNE, 1930

How Fast Is "Quick"?

THE DERIVATION of the term "quick-freezing" is perfectly obvious: it was coined to indicate freezing more rapidly than was formerly the practice, and to set apart those products which gained in quality thereby. Yet it seems almost as obvious that, if the term is to have a logical and definable meaning, we must know how fast is "quick." And that old familiar poser, "How high is up?", is no more unanswerable.

A speed of freezing too slow for one product, unless deterioration is to result, may be far too fast, economically, for another. Just as the "cold" in "cold weather" means one temperature for the Eskimo, and a very different one for the Fiji Islander, so the "quick" in "quick-freezing" may mean one rate for fish and a very different one for strawberries or spinach. Thus, to set up as a definition of "quick-frozen" foods any specific time of freezing, such as two hours, or any specific rate of freezing, such as one inch per hour, would divorce the word from any relation to quality or economics. In other words, it would make it possible to call one product "quick-frozen," although subject to deterioration, while another in which no deterioration had taken place would not be entitled to the name.

If, on the other hand, we define "quick-freezing" on a quality basis—say, a speed of freezing high enough to prevent deterioration—we must not only define deterioration but also in some way take into consideration all the factors, in addition to freezing time, that determine quality of product. Otherwise, one might as well judge the quality of two automobiles on the rate of speed they will reach without vibration, and neglect to consider the fact that one is a sport coupe and the other a 10-ton truck. Yet if our definition includes both speed of freezing and all the factors that control quality, "quick-freezing" becomes merely a synonym for "good freezing," and obviously too all-inclusive to facilitate differentiation.

After all, "quick" is a relative term—if one happens to be freezing faster than he did in the previous year, perhaps three days compared to ten days, then it seems quick to him. But is it "quick-freezing?" Then too, it is easily possible that the advantages of more rapid freezing may make universal an increase in this rate. Will the word "quick-freezing" then mean more than the word "frozen" itself? "Quick as compared to what?" is the logical inquiry.

Omitting ice cream and its related products, there are essentially two kinds of frozen foods: first, products that the retail customer never realizes were frozen; those in which freezing has been an intermediate warehousing operation, such as barrelled frozen-pack fruits that go to the preserve maker; second, products that go to the retail customer as individually frozen units, foods that will be acceptable exactly to the extent that they approach the fresh product in flavor, texture, color, and appearance.

There is a logical field for both these types, but they differ radically in purpose, packaging, processing, and price. If we should elect to call one group "slow frozen" and the other group "quick-frozen," there is nothing particularly damnable about it. But we should remember that we are not distinguishing between freezing times at all—we are distinguishing between two types of product as different as the sport coupe and the 10-ton truck.

Only after we had determined the capacity, the cost, and the kind of service needed would we begin comparing automobile speeds. And only after we determine what we are freezing, why we are freezing, and what type of preservation we want the freezing to give, can we decide just how "quick" we want our freezing.

Keep the Log Book Going

WE ARE NOT ARGUING for alibis. Anyone who is wise enough to be a factory head does not need an alibi. If, however, your sales department has registered a severe and well-placed "kick" on a lot of goods that have proved unsatisfactory, what method have you as a production man of tracing down the source of the trouble? All who have had experience in supervising production can testify that such complaints can cause sleepless nights. Selling goods is a tough job, and the salesman, rightly or wrongly, sympathizes with the customer. Under these circumstances the production department is always thought to be wrong.

Assume that the goods have been properly coded and that it is easy to determine that they were made on Sept. 28, 1929. Also assume that, for once, the sales department is right—that it is not a case of a customer making a bid for a price reduction. The goods are inferior in quality, and a customer who buys twelve carloads a year is sore, clear through. He is done with your firm—forever. A hot wire comes from the chief demanding an explanation of what happened.

Something, whatever it was, happened over six months ago. Without doubt the chief is about twice as sick as you are about the lost business. Perhaps the directors have been rawhiding him for more profits—for even *some* profit.

What could have happened on Sept. 27 or 28, 1929, that caused a sizable lot of goods to be off quality? If you have had the foresight to keep a diary, you will dig it out of the center drawer of the old desk and turn back. Perhaps it contains an entry, seemingly unimportant at the time, that explains the trouble, such as "Power off 8 minutes at 4:10 p.m.—thunderstorm," or "Lighting circuit out of order all day—sunlight poor";

or "Bill Jones says new lot of . . . does not work up right; purchasing department insists that it be used —has a 5 per cent moisture content"; or possibly, Elmer, your eagle-eyed foreman, went to a funeral that day, or some such entry that will give a clue to the source of the trouble.

The factory log book is worth all the effort it costs and should be kept up every day. One can never know when the least suspected incident may be of inestimable value in fathoming obscure events of the past, for it is an unusually well-managed plant that runs so smoothly that it has no incidents of significance for the log book. If you are a new man on the job, or an old timer who has never done it before, the carefully kept log book will be a valuable asset.

Co-operative Research Needed

IRRESPECTIVE of its form of action or its capital investment, research typifies progress. It has been well defined as "accelerated experience," a definition which expresses a hope that the future will be forecast by means of experiences created under strict control and at a greatly accelerated pace. Without question the spirit of this definition has actuated those industries that have catapulted us into the era of air transportation, television, talking motion pictures, quick-freezing, and the like, and is responsible for some of our large industries being outdistanced so completely that in comparison they appear to be groping in the darkness of antiquity.

Instead of being summoned to account for time and money spent on research, directors of large corporations and leaders of industrial associations are now being questioned by the corporation stockholders and the individual association members to explain why more active support has not been given to research. No longer is the research department regarded as a luxury, an appended decoration, to be indulged in only during prosperity. Rather, the conception of a research department has evolved into the conviction that every department of the corporation, or every unit of the association, is a member of the research organization, that this formal research organization is to be its counsellor in matters of moment, its leader in periods of depression, its savior in times of stress.

American representatives of an important food industry are soon to assemble as a committee of the whole to discuss the future. Research of limited nature has been supported only sporadically in the industry, with no outstanding accomplishment. The exigency of the era would seem to demand a departure from such limitations. Only by unified co-operative effort can this industry expect to overcome the handicap that it has put upon itself by hesitating so long to take definite action toward removing its self-imposed fetters. Elsewhere in this issue will be found the review of a book which essentially is a report to the association and in which some of the commercial problems of the industry are outlined and summarized by one of its outstanding technological authorities. With the report as a beginning, this convention could instill into the industry the spirit of progress by authorizing co-operative research on the basis of the definition that, "research is accelerated experience."

An Important Problem of Design

DID YOU EVER SEE an executive with his desk so arranged that he had to sit parallel to the edge and twist his body around at right angles to his chair when reading, writing, or working on the desk top? No; neither did we! An executive who would regard as absurd such a desk or table in his office frequently installs in his plant sorting and packing belts, and other working equipment that is equally impracticable for his employees.

Custom places the return pass of a sorting belt directly under the working pass by the use of a single pulley at either end. Why not employ two pulleys at each end, one at the working level and another close to the floor level, so that the return pass might be housed close to the floor and form a comfortable foot rest for the workers? They might then sit facing the belt with their knees under the working section. We realize, however, that the problem of driving such a belt may require considerable study.

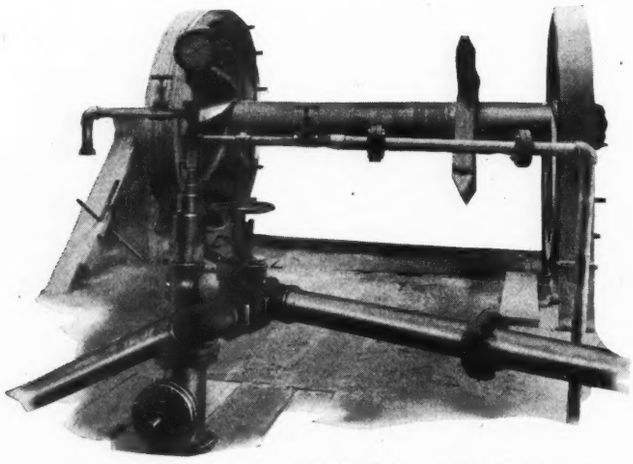
Or is there any reason why in some cases the return pass might not be elevated well above the heads of the workers, thus leaving space both above and below the working level open for convenient approach to the belt? This, of course, would make the inside surface become the working surface, and it might be objectionable in cases where the materials handled are those that should not touch that part of the belt which runs in contact with the pulley face. In other cases, however, it might afford the most convenient arrangement, provided, of course, that it can be driven mechanically.

The important consideration is that comfortable working positions should be provided at sorting and packing belts, just as much a matter of course as comfortable working places are provided for desk employees in an office. The return in better work and better satisfaction on the part of employees would repay the expenditure for these suggested rearrangements. The recent reports of the Consumers' League should give pause to factory executives, on this matter of needless employee fatigue.

The problem raised here is not one of easy solution —as anyone knows who has faced it—but it is an important one. If any of our readers know how this can be handled successfully, without creating an industrial monstrosity that is worse than the condition it is intended to alleviate, we wish they would tell us about it.

Diverse SALT SPECIFICATIONS

Met by Modern Manufacture



The head of a salt well gives little indication of its importance in our civilization

By DOROTHY ROBINSON
Head Chemist, Ruggles & Rademaker
Manistee, Mich.

THERE is a silver thread of salt closely woven into the fabric of all human history. It is doubtful if any commodity has had a greater effect upon the history and civilization of the peoples of the earth. Its value from ancient times is most clearly indicated, perhaps, by the prominence salt has occupied, not only in commerce but in religious and moral development. Invariably it was used in religious rites as a worthy offering, and every language has its common sayings concerning the welding of bonds of friendship through the eating of salt. Such a one is the Arab phrase "There is salt between us."

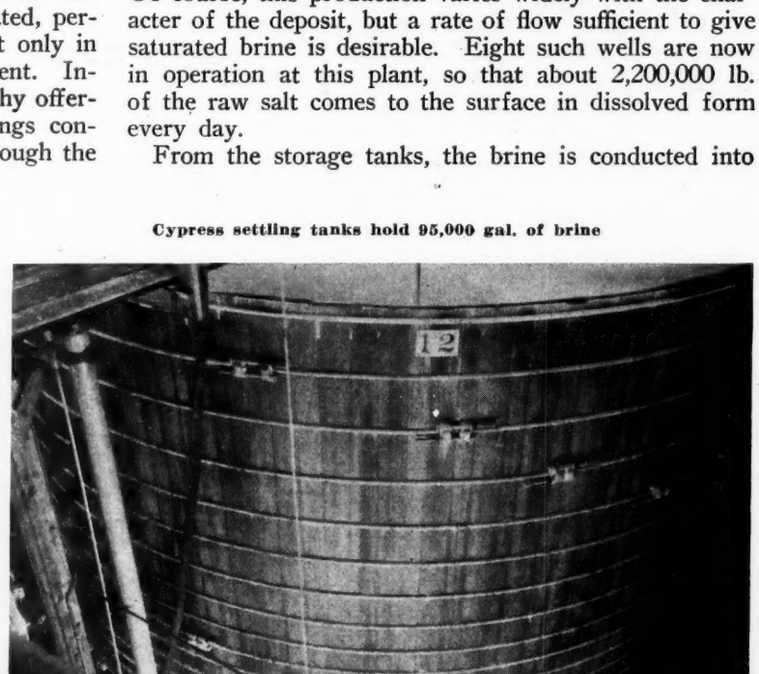
Today, in an age when modern science and mechanical methods bring within reach of even the humblest workmen many things for which kings of old would readily have gone to war, salt is still "between us"—an essential if inconspicuous bond that sooner or later enters the preparation and consumption of practically all comestibles. Just as salt has been, and must be, a basic component of the diet of living creatures, so salt production always has been, and always must be, one of the world's truly basic industries.

The present processes that precede the appearance of salt in marketable form are by no means as simple as the age of the industry might lead one to believe. In the section of Michigan adjacent to Manistee, where the Ruggles & Rademaker salt plant is located, rock salt exists in great beds approximately 2,000 ft. below the surface of the earth. These beds average about 30 ft. in thickness. The so-called salt wells consist of large pipes or casings driven to a depth of about 1,500 ft., inside of which are pipes of a smaller diameter which extend about half way through the salt bed. The wells at our plant consist of a 14-in. casing driven down about 300 ft., then a 10-in. casing down 500 ft.; inside of which is one of 8 in. going down 600 ft.; one of 6 in. going down 1,200 ft.; and finally one of 4½ in. down 1,800 to 2,000 ft.

Each salt well is surmounted by a drill house which covers the pumping machinery. Water flowing down through the outside pipe filters naturally through the remaining earth to the salt bed. Here it dissolves the salt into a saturated solution of brine which is brought to the surface by compressed air pumps and flows into storage tanks. About 150 gal. per minute of this brine, having an NaCl concentration of about 26 per cent will be produced by a salt well of the size given above. Of course, this production varies widely with the character of the deposit, but a rate of flow sufficient to give saturated brine is desirable. Eight such wells are now in operation at this plant, so that about 2,200,000 lb. of the raw salt comes to the surface in dissolved form every day.

From the storage tanks, the brine is conducted into

Cypress settling tanks hold 95,000 gal. of brine



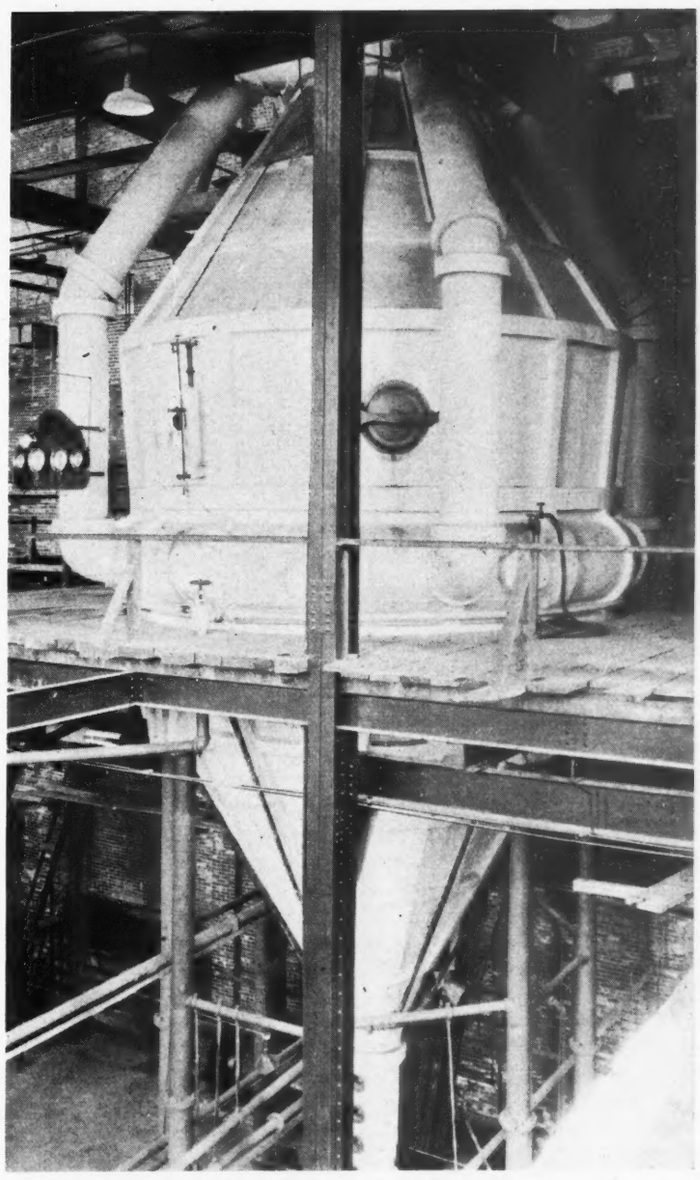
twelve cypress-wood tanks, each holding 95,000 gal. of brine. Here the brine is allowed to settle a number of days and such impurities as calcium and magnesium sulphate drop to the bottom of the tank. The brine is then ready to be drawn off and sent to the evaporators.

There are two main classifications of salt, distinguished from each other by the form of the grain. The "open grainer," or Michigan, process produces the flake salt, whereas the vacuum-pan method produces the granulated salt.

Great, shallow, open vats, 120 ft. long and holding 23,000 gal. of brine, comprise the chief equipment in the grainer process for making flake salt. Nineteen such grainers, each with a capacity of 625 gal. of brine per hour, are in continuous operation. Steam coils suspended in these vats heat the brine brought from the settling tanks to a temperature just below the boiling point. Thus, by slow evaporation, the water is released from the brine. This causes the salt to form in flaky grains at the surface and then settle to the bottom of the vat. Size of flake is governed solely by the temperature — the lower the temperature, the coarser the flake. A temperature of 195 deg. F. gives a product in which the flakes are of optimum size for most uses.

All grainers in operation at this plant have mechanical rakes for the continuous removal of salt from the bottom of the grainer. The motion of the rakes is a reciprocating movement actuated by a hydraulic cylinder. At each forward or working stroke of the rake, salt is scraped along the bottom of the grainer for about 8 ft. Each grainer has scrapers so placed that on each return or light stroke, the preceding scraper overlaps the extreme working stroke of the scraper behind, thus picking up the load of salt left on the last stroke and carrying it forward another stroke length for the next preceding scraper to catch.

The salt is slowly raked over an incline at the end of the grainer, where a large portion of the entrained brine is allowed to drop back into the grainer. This washes the salt flakes just removed from the brine. The salt falls over the incline to a belt conveyor running at the rate of 300 ft. per minute. This conveyor carries the salt to the vacuum filters, where the first stage of drying takes place. The vacuum filter at the plant handles about 24,000 lb. per hour of the wet salt, and another is in process of construction.



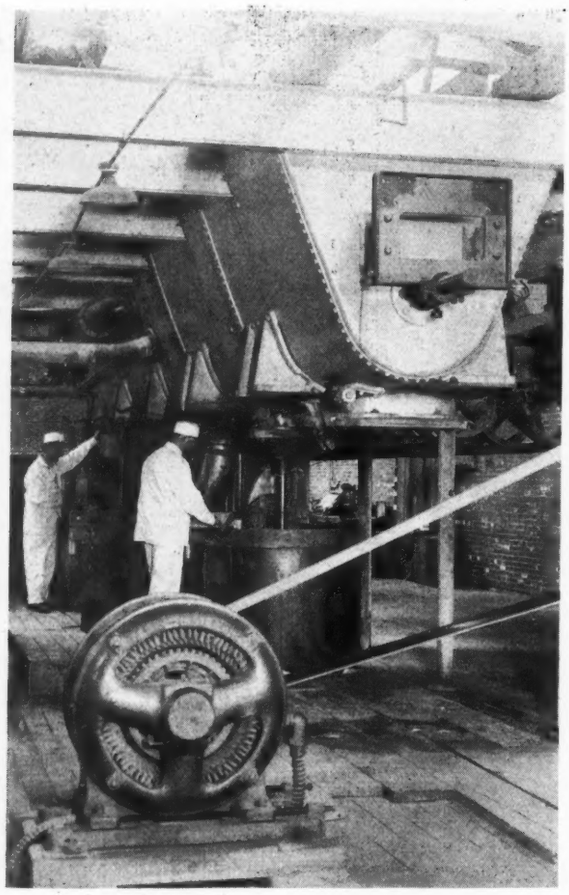
One of the five vacuum-pan evaporators. Each has a capacity of 21,000 gal. of brine and weighs 200 tons

SALT made by the vacuum pan method has fine, lustrous granules. Each evaporator or vacuum pan may be described as consisting of two cones whose bases are separated by an upright cylinder called a steam belt. The top and bottom faces of the cylinder or steam belt are flue sheets connected by 22,000 copper flues through which the brine can circulate. These pans weigh approximately 200 tons apiece and have a capacity of 21,000 gal. of brine each. There are five such pans at the plant.

Mechanical operation of the five vacuum pans is briefly as follows: Brine from the settling tanks is admitted to the evaporator; it passes through the heating element or steam belt, down the center well, and up through the tubes again by forced circulation. This operation is repeated until the brine absorbs sufficient heat from the heating element to liberate water in the form of vapor. The vapor leaves the brine to pass over and form the heating medium for another evaporator. The crystals of salt normally form in the most concentrated part of the liquid, which is at the top, where the water is leaving as steam. When sufficient crystals have collected, they drop to the bottom of the pan into the boot, from which salt is continuously removed.

The evaporators form a quadruple-effect system, the latest development in salt-making practice. Making use of the principle that a decrease in pressure above the brine lowers the boiling point, the steam arising from the brine in one evaporator is condensed in the steam chest of the next evaporator to heat and vaporize the lower-boiling (due to a decreased pressure) brine contained therein. Exhaust steam from the electric generators used in the steam chest of the first evaporator furnishes the only primary source of heat for the four evaporators.

In other words, in the quadruple effect, there are four transmissions of heat supplied in the steam. The steam



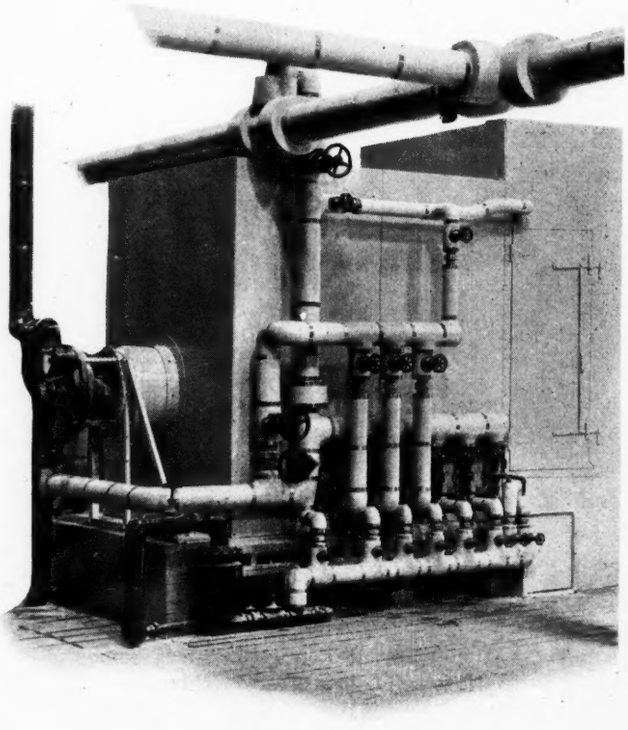
Battery of eight centrifugal dryers. A 5-minute run gives the salt its initial drying

enters the first body and is condensed, the latent heat thus liberated being transmitted to the brine on the other side of the tubes. This causes the formation of vapor, which in turn is transmitted by means of pipes to the second body, and it there acts as the heating medium. As in the first effect, the vapor is condensed and the latent heat is transmitted to the brine and vapor formed. This process in the second, third, and fourth pans is the same as in the first, except that the brine boils at a slightly higher vacuum (lower absolute pressure) and lower temperature. In best practice the last pan in the effect boils at a temperature of 86 deg. F. under an absolute pressure of 1¼ in. Hg. This reduction from the atmospheric pressure of about 30 in. Hg. (14.7 lb. per square inch) is obtained by a large condenser and an air pump driven by a motor of 75 hp. and a 12-hp. steam engine, respectively.

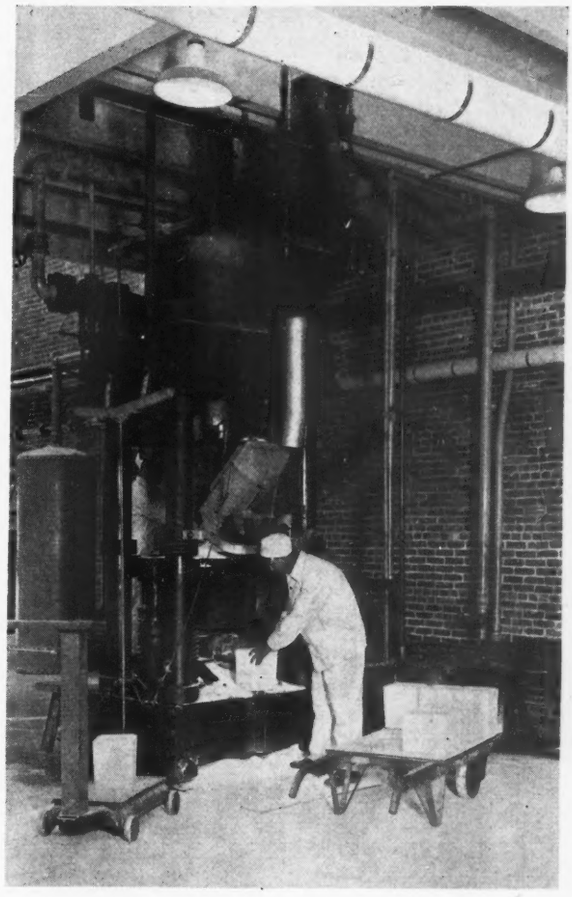
The concentrated mixture of salt and brine which is removed from the bottom of the pan is pumped to centrifugal dryers revolving at high speed. Eight such centrifugals are in use at the plant, capable of handling 1,000,000 lb. of salt. It is customary to run these dryers for 5 minutes on each batch of salt previous to the final drying operation. At the present time, the plant engineers are installing a vacuum filter to take the place of these centrifugals. A vacuum filter will wash as well as dry the salt coming directly from the pans.

Flake salt and granulated salt are given their final drying in the same manner after the flake salt comes from the vacuum filter and the granulated salt comes from the centrifugals. For some purposes, especially the bulk trade, the salt is air-dried. Huge piles of salt are allowed to drain and season on the warehouse floors for several weeks before being shipped. About 22½ per cent of the total production of our plant is dried in this way. Refined salt is for the most part kiln-dried. This is done in one of five revolving steel drums, each 32 ft. long and 6 ft. in diameter. The drums are lined with Monel metal to prevent discoloration of the salt. As these drums or kilns revolve slowly, tumbling the salt over and over, air at a temperature of about 1,800 deg. F. is blown by a fan through the salt the length of the drum. The capacity of these dryers is from 4 to 20 tons of dry salt per hour, depending on the kind being dried. In the 30 minutes required for passage through the drum, the salt is thoroughly dried, and it then passes through a screen and out of the dryer to an elevator which conveys it to the upper floors of the 6-story refinery, where it is again screened and graded by automatic machinery.

There are three kinds of screens in operation at this plant: sifters, rotex screens, and electric vibrating screens. The size of the screens varies from 14 to 80 mesh per square inch. Salt from the screens falls through chutes to a series of bins, where it is sorted



Salt-lick blocks for cattle are formed at a pressure of 1,000 tons per square inch



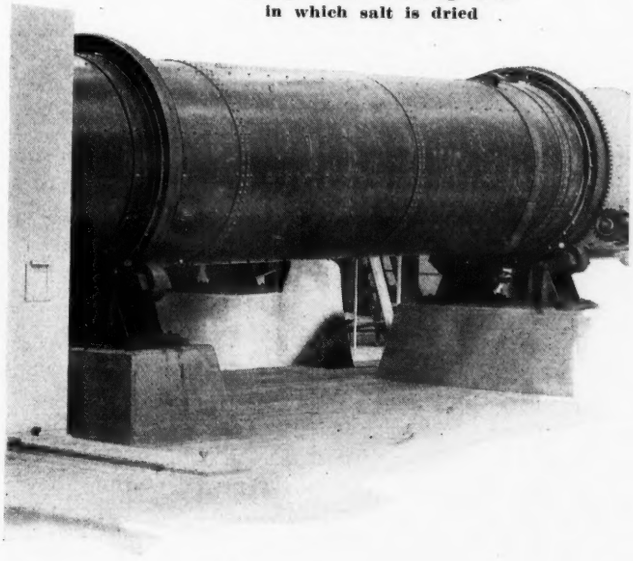
as to size and grain. From one of these bins, salt is drawn off and mechanically mixed with 0.02 per cent potassium iodide to make the iodized table salt. Mechanical mixers also incorporate 1 per cent filler with the salt to be used for table purposes, to prevent absorption of moisture and consequent hardening. From the bins and from the mixers the salt goes directly to the weighing and packaging machines.

On one floor of the refinery, package shells are wrapped with the labels and dropped down to the next floor. Here they are filled, weighed, and sealed by machinery to be put on the market as the 2-lb. round carton of table salt. On this same floor, "pockets," the trade name for small bags, are filled, sewed, and packed for shipping. The square-carton machines fill, weigh, and tight-wrap with attractive labels boxes of salt weighing from 1½ to 3 lb. The large packages are all handled on the main floor. Adjacent to the refinery is a cooper shop making the barrels to be used in the salt plant. These barrels are rolled automatically from the cooper shop to the refinery, where they are filled, weighed, and loaded into freight cars. Bags weighing from 25 to 200 lb. also are filled and sewed on this floor. At no time through the entire process is salt handled by human hands.

Table salt is far from the only factor in the business of the plant, constituting but 50 per cent of the production. Most of the large users of salt desire a product particularly suited to their needs. Butter makers must have a small, soft-flake salt of high purity; the cheese manufacturers desire a similar salt but of coarser grain; the canners demand a fine granulated salt to maintain color and freshness in their products; the flour manufacturers mix an exceptionally fine salt with prepared flour. The meat packers in Chicago alone, last year, used 500,000 tons of coarse flake salt in curing and preserving meat. In other words, each manufacturer must have a salt which is adapted for his purpose, and by varying treatment of brine, method of manufacture, drying, and screening, all of these demands can be supplied. Even the farmer has salt put up especially for his use. Fifty-pound lots of granulated salt are dried and pressed in a large hydraulic press by 1,000 tons per square inch pressure into a salt block to be used as a salt lick for cattle. Chemically pure salt, used for scientific and medicinal purposes, also is made at this plant.

The chemical laboratory plays an important part in salt production. A constant check is placed upon all salt manufactured. The laboratory serves two purposes, analytical and research. Research is the price of progress, and in no better place is this illustrated than in the salt business. The progress from the boiling of brine in open iron kettles to the modern vacuum-pan evaporation is the result of years of patient labor of this kind.

Air at 1,800 deg. F. blows through this revolving kiln in which salt is dried



Applying the Principles of Roasting To CACAO

By GEORGE DEFREN
Consulting Chemist
Newton, Mass.

ROASTING CACAO BEANS goes back to the days of the Aztecs—at least, the first records of cacao beans came from Mexico. By primitive methods, it was found that roasting cacao beans gave them an aromatic odor and flavor which made them much more acceptable as food products, especially in the form of a beverage, than was the case with raw beans. In recent years, mechanical progress developed the rotating drum roasters, some being of the ventilating type. In these, a sheet of flame impinges on the outer side of the rotating drum, the products of combustion being forced finally through the interior of the drum, thus carrying away some of the fumes emanating from the roasting beans. Within a mile or so of the plant the atmosphere is fragrant with the odor of roasting cacao.

Heretofore, the main essential of roasting cacao beans seems to have been to bring the bean itself into direct contact with a hot metallic surface, and to repeat that process by tumbling the beans over one another in contact with the hot drum until they are roasted. I was informed by the head of a large organization several years ago, when I suggested the theoretical possibility of continuous roasting, that such a process was impossible because the beans must be brought into direct contact with a hot metallic surface. Experience in other lines, however, such as the manufacture of malt, wherein malt is made from wet germinated barley, dried and roasted by a mass of moving heated air, caused me to formulate a statement of what actually constituted cacao-bean roasting—in other words, to consider the fundamentals of the process. The final results give a very good illustration of what the fundamentals in one industry, which has been subjected to thorough scientific investigation, are capable of producing in another industry which has developed only to the state of an art.

The object of roasting the beans is to develop a characteristic flavor. Secondary results involve the evaporation of excess moisture, volatile acids, empyreumatic products, caramelization of the carbohydrates, altering the nature of the albuminous constituents and tannins, loosening the shells from the kernels, and similar results, all of which are due to the action of heat at elevated temperatures. Heat has been applied in cacao-bean roasting by means of wood fires, burning coal, oil, gas, steam heat, and recently in electrically heated drums.

In practice, roasting consists of obtaining the mixed flavors from a multiple number of heated beans. The problem can be analyzed best by considering what happens to an individual bean. As the cacao bean reaches us it has a shell tightly cemented to a kernel. Considerable acid, and a bitter taste that is often rank, together with moisture in amounts ranging from 8 to 16 per cent are found in the bean.

Roasting the bean requires the application of sufficient heat to dry out the water, which means that each bean becomes a miniature steam boiler. As the bean is heated the moisture in the kernel is changed into vapor or steam, which presses against the shell, loosening it from the berry, often cracking the shell and allowing the steam to escape. The steam takes with it the volatile acids and matter decomposing because of roasting, by the process familiarly known to chemists as "steam distillation." As the moisture in the bean becomes less, the kernel shrinks from the shell, which is ultimately removed by cracking and fanning, or "winnowing."

It was found by actual trials that the lower the temperature, the longer must be the period of time to produce a "roast"; conversely, the higher the temperature, the shorter the time of heating to get equivalent results. It was also demonstrated that, if most of the moisture were removed to about 3 per cent, a noticeable flavor

■

Seldom does one find so clear cut an illustration of the basic concept of *Food Industries* as is shown by Mr. Defren's article, "Applying the Principles of Roasting to Cacao." From the manufacture of malt he has brought an accurate knowledge of the science of roasting to the chocolate industry and applied it with unusual—or shall we say, the expected—success. His analysis of the problems of roasting cacao beans applies equally well to the roasting of almonds, coffee, and peanuts.

Other articles by Mr. Defren will appear in the coming year. His next article will be of great importance and significance to users of cocoa butter, cocoa powder, and to chocolate manufacturers and confectioners.

—The Editors.

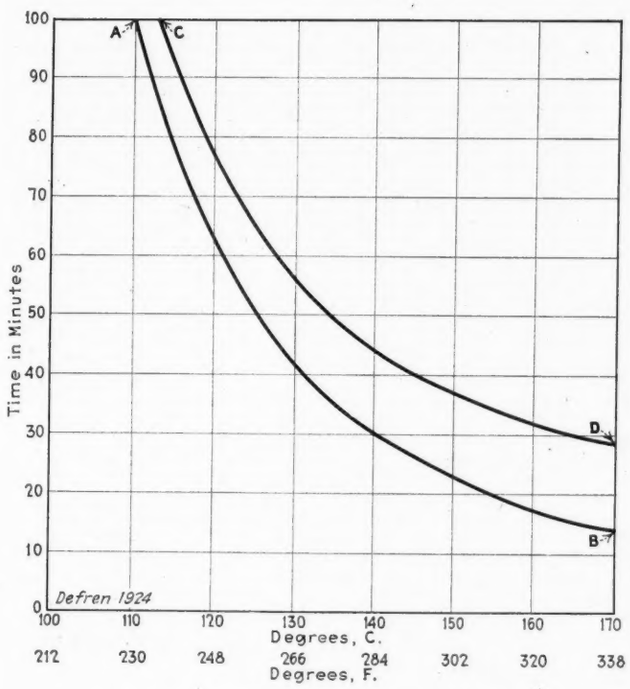


Fig. 1—Time curves for roasting cacao beans

becomes apparent even at 90 deg. C. This, of course, required a long heating time. Temperatures above 100 deg. C. naturally give more pronounced flavors. In other words, the two variables, temperature and time, were functions whose product equalled a constant.

Expressed mathematically, the function of Time, T, multiplied by the function of Temperature, T', equalled a constant C, meaning "roast," "flavor," or the like.

$(f)\ T \times (f)\ T' = C$, which is a general equation.

We are dealing with the problem of roasting whole beans: the method of everyday practice. Heat at the surface cannot penetrate to the center of the bean as rapidly as applied. One particle acts as an insulator for its neighbor. The portion of the kernel in contact with the shell, therefore, is hotter than the interior of the bean. In other words, all parts of the bean are not under uniform conditions. But, had we dealt with minute particles, which would be necessary for a purely mathematical solution of the problem, we should have taken ground nibs for roasting to insure uniformity; and the roasting curve would have been different—a steeper one than those actually obtained. The curve, however, would also represent the same mathematical formula, although of undoubtedly different numerical values. This is plainly evident from an inspection of the curves presented herewith.

Testing these concepts practically, the use of the same quantity of the same uniform quality of beans, and roasting them at different temperatures, should produce equivalently flavored roasts—short of burning—in different time periods. In each case 8 lb. of beans was put in an experimental coffee roaster, heated by gas, the flame not being in contact with the drum. The temperature was regulated by means of a chemical thermometer with its bulb buried among the beans, which were kept in constant motion by continuous turning of the roaster. The "end-point" of the roast was determined in each case by an experienced operator. I kept the records of the temperatures and the time of roasting. By plotting temperatures against time, the resulting values gave a well-defined curve, which I will call the "roasting curve." (See Fig. 1.)

Two curves are shown: *AB*, in which the roasting time was recorded as the number of minutes after the thermometer had attained the roasting temperature; and the other, CD, closely related to the first curve, in which the time of roasting was recorded as the number of minutes after the thermometer had registered 100 deg. C. on its way to the roasting temperatures. Different beans give different curves, as would be expected from the nature of the beans, but the general "slope" of such curves approximate those shown in Fig. 1.

INSPECTION of these curves emphasizes the fact that no roasting flavor develops until a considerable percentage of moisture has been removed. After that condition has been reached, the heat then causes interaction between various constituents of the bean, the ultimate result of which is the characteristic flavor that is desired. High temperatures are not necessary to produce a "roast," but if high temperatures are used, a shorter period of time of heating gives equivalent results. In other words, any temperature above 100 deg. C. but below that which would give a "burnt" taste, or flavor, should give a roasting result, dependent on the time of heating.

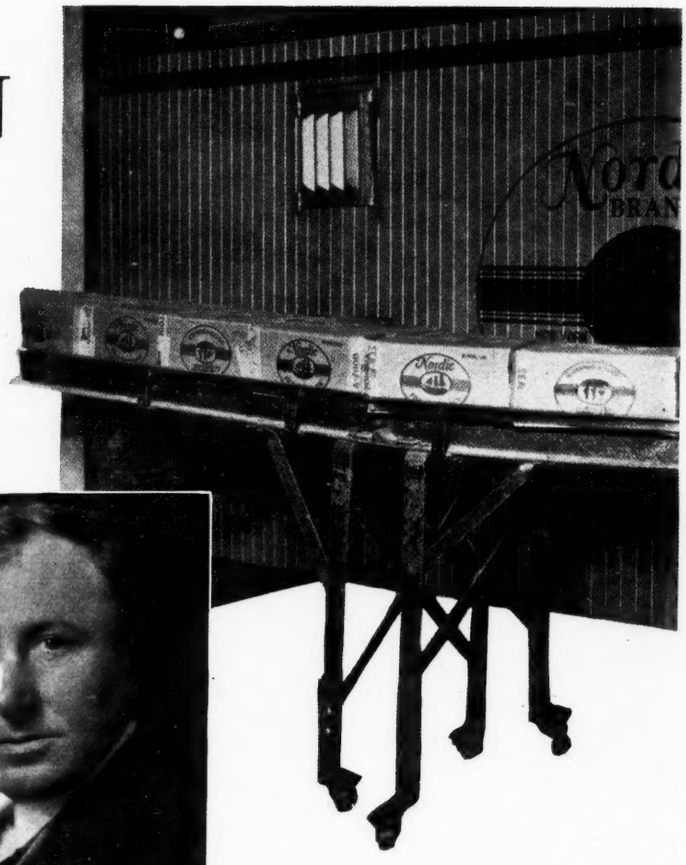
Having demonstrated the close relationship between the drying and the roasting of cacao beans, I found that it was only another step in the evolution of the problem to dry and roast beans, without contact with a hot metallic drum, by the use of a stream of heated air to do the work.

Fundamentally, roasting cacao beans is essentially the same as making malt. One of the finer developments of the production of high-grade malt has recently been applied to the commercial roasting of cacao beans. It is known that the best flavor can be produced when the moisture content of the beans has been reduced to about 3 per cent. The heat is continued, but with the air drafts closed, so that the volatile aromatic flavors are not then distributed around the neighborhood of the roasting plant. As far as I am aware, there is only one apparatus where the principle here enunciated is applied to cacao-bean roasting, but it has met with marked success. It accomplishes exactly what would be expected. Not only are the beans dried and roasted but they are as clean after roasting as when first taken from their shipping bags. They are entirely free from the carbonized or burnt shell, which invariably accompanies drum roasting.

It may be of interest to other industries—such as peanut, coffee, and almond roasting—that their products fundamentally can be treated with results just as favorable as have been indicated here in cacao-bean roasting. The general mechanism of roasting is well known, for it has been developed in that well-known institution called the "College of Trial and Error." Nevertheless, the mathematical demonstration of roasting conditions is one of the fundamentals from which many important developments have been originated, such as: improving the quality of cacao beans, eliminating the necessity of pressing beans for cocoa butter, eliminating the "conche", cutting costs of chocolate coatings, lowering the viscosity of coatings, evolving a new type of bean, developing a new process of making coatings, and was an important factor in the birth and evolution of the continuous roaster.

DISTRIBUTION HURDLES

In Quick-Frozen Foods



An Interview
by O. Fred Rost With
F. W. BRYCE
President
Atlantic Coast Fisheries Company

F. W. BRYCE

DYNAMIC ENERGY of the type that characterized the builders of vast enterprises during the last half century found, up to a decade ago, its best opportunity for expression in solving problems of production and finance. Finding a market for the finished product was not a problem, because the normal demand still exceeded the supply in almost every line of industry.

Then came the collapse of 1920 and the sellers' market of many years' standing turned into a very pronounced buyers' market almost over night. As orders for goods grew scarcer, executives in one industry after the other awakened to the need for better methods of marketing and simpler processes of distribution.

We have witnessed in the last decade a change in the direction of executive control and guidance. The energy that but yesterday applied itself exclusively to the problems of production has become interested in bringing order out of the chaos of intricate, burdensome, wasteful habits of distribution.

Progress moves in certain well-defined cycles. It was quite natural, therefore, that in the era that added "distribution-mindedness," the world's first industry, the food industry, should be the first to bring forth an offspring that would be typical of the changed conditions.

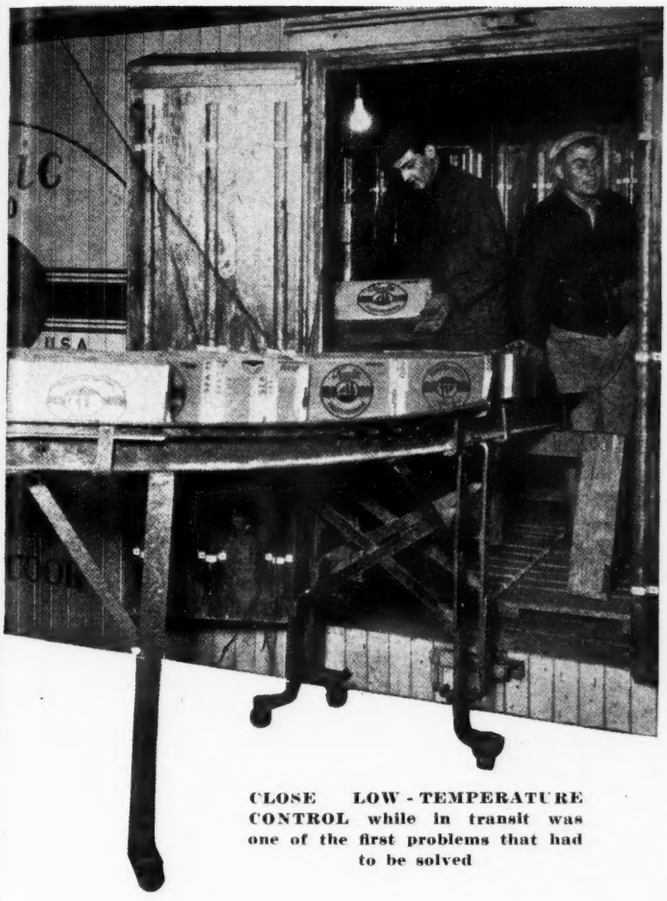
The quick-frozen foods industry not only employs knowledge in the fields of science and economics of production but it promises to become an example of how simplification and elimination of waste may be successfully effected in the distribution of certain products. Obviously, when the manufacturing and distributing processes of an entire industry can be started from "scratch" without the many retarding, confusing, and costly influences of habit, tradition, trade customs and what not, there will inevitably result unprecedented efficiency and economy. However, in the case of quick-frozen food, the very factors that make possible the utmost economies and reduction in waste while the product is being made ready for the market, by their very nature impose certain definite and inescapable responsibilities upon each function in its distribution.

Pioneer in the field of quick-frozen foods, the Atlantic Coast Fisheries Company has achieved an enviable record of consistent growth. Therefore the story of how it dealt with the many problems that arise when pioneering in a new field, and the "minimum demands" which it finally determined as indispensable, is indeed intensely interesting.

"Quick-frozen foods offer four possible points of advantage," says President F. W. Bryce, "that may be briefly outlined as follows:

"1. The possible delivery of a better product to the consumer.

"2. The preserving and storing of products in times of plenty against times of scarcity.



CLOSE LOW-TEMPERATURE CONTROL while in transit was one of the first problems that had to be solved

"3. The storing of seasonable products for use during the period of non-production.

"4. The economic advantage in reducing waste in distribution by shipping from the point of production only edible portions of meats, fish and other products.

"While the last advantage could be equally enjoyed on certain meat products without adding the cost of quick-freezing, it nevertheless is at present typical of our process. I am naturally interested in seeing a healthy development in the production and distribution of products in frozen form and therefore believe that before dealing specifically with the distribution phase of the subject I should outline briefly the present status in the production end of the industry.

"Quick-freezing is still a new art and its present state of development may be compared with that of the automobile of 30 years ago. Virtually, it is merely a progressive step ahead of sharp-freezing, which has been employed particularly in fish cold-storage warehouses for many years. Quick-freezing results from the circulation of extremely cold air, from spraying with brine, from immersion in brine, or from contact with metal, made and kept extremely cold.

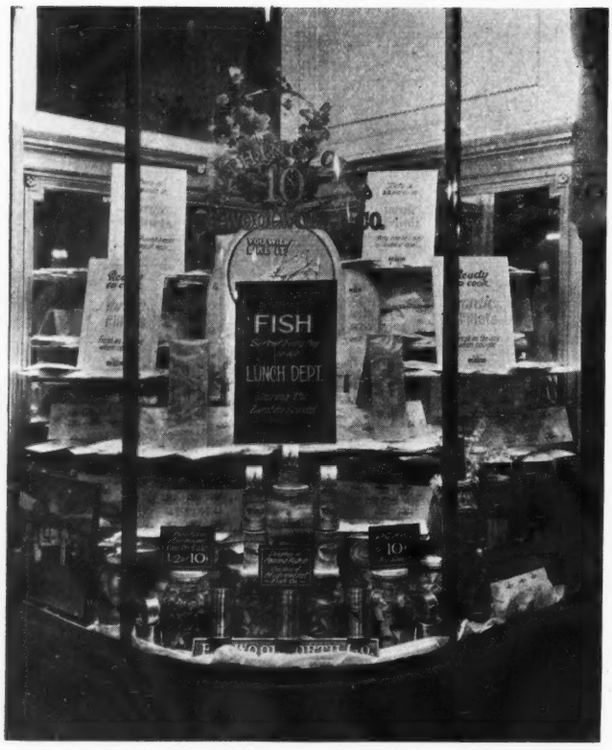
"One of its outstanding advantages over the older and best known method of preservation of food, that of canning, is that canning nearly always changes the flavor as compared with the fresh or uncooked article, whereas freezing obviously preserves the flavor nearer to its fresh state. However, no product can be so frozen or so insulated while in transit that it may be shipped for great distances and arrive at warehouse or distribution points without becoming defrosted, unless properly refrigerated in transit. Once defrosting has taken place, if the product is to be preserved it must be re-frozen, which not merely involves more expense but results in material deterioration of flavor and loss of weight.

"Therefore, I cannot stress too strongly the point that quick-freezing in the preservation of foods is not a cure-all for the disadvantage of slow-freezing but, of itself, quick-freezing merely seems to lessen the disadvantages of freezing. The Atlantic Coast Fisheries Company's interest in quick-freezing lies in the economic advantages of the method with fixation of flavor and nutrition as primary in importance, and has built devices to fit the ideas of its technical, engineering, and manufacturing departments, resulting in continuous straight-line mass production.

"We found that the development of quick-frozen products for continuous public consumption on any substantial scale must be predicated upon a thorough study of each product, one by one, and developing the proper method of processing that product, the proper method of freezing that particular product, and the proper packaging of that particular product.

"It is important to remember that even though a product is quick-frozen, certain changes take place slowly, there being a gradual loss of nutrition and flavor, which was evident to a marked degree after 30 days' storage, and to a more marked degree after 90 days' storage, which latter period is less than a minimum necessary for practical commercial purposes. This seemingly is due to the fact that at present there is no such thing as 100 per cent freezing of any article or any food product. Also, our tests indicate that the loss of flavor and nutrition which upon defrosting included a very definite

CUSTOMERS "FROM MISSOURI" are soon convinced of the quality of frozen foods purchased from this A. & P. store in Kansas City



BEHIND the familiar "Nothing over 10c." slogan of the F. W. Woolworth stores, the economy of the product is advantageously stressed

shrinkage in weight as well, could be lessened by improved packaging methods.

"Now, assuming that the manufacturer, packer, or producer has done all that can be done to safeguard his product while it is being prepared for the market, we reach the first major hurdle in the distribution of quick-frozen foods: namely, the need for definite assurance that the product will remain frozen at least until it reaches the point of distribution. Preferably, it should be constantly kept at a temperature of 15 deg. F. or less, which means at least 17 deg. F. below freezing point.

"This problem was solved with the perfection of the "Silica-Gel" refrigeration cars. We now have a fleet of 60 of these cars and are successfully shipping our quick-frozen fillets, whiting, and the like to all points of the United States.

"Another major hurdle that we had to negotiate was that of finding proper wholesale distributors. Having passed from the packing point successfully, and in perfect frozen condition to the distributing point, the product becomes perishable the moment it leaves the refrigerator car unless suitable storage or warehouse facilities are provided.

"Present-day cold-storage facilities measure up only reasonably to the needs of quick-frozen foods distribution, but there is a distinct tendency on the part of owners of warehouses to improve their facilities so as to meet the rather exacting requirements of our industry. Definite and continuous progress in that direction, of course, will be most welcome to all producers of quick-frozen foods.

"Obviously, distributors handling large quantities of quick-frozen foods must learn, or must be taught, just the type of storage facilities they should have, just the temperatures that should be employed, just exactly what air space should be, what air circulation is required, and the like. On the other hand, there are already many wholesalers of various perishable goods who are more or less well equipped to warehouse and distribute our products properly. In many cities either the wholesale fish dealers, meat packers, or vegetable and fruit distributors have well-equipped cold-storage warehouses. We found that some of them were readily convinced of the value of quick-frozen products as an added profit-builder, after just one carload of our fillets had been distributed as a test demonstration."

The "Nordic" brand of quick-frozen fish, as produced by Atlantic Coast Fisheries Company, reaches the wholesalers in attractive cartons, accompanied by display and advertising material. In other words, they have a well prepared plan of merchandising. Therefore it seemed obvious that Mr. Bryce's failure to mention the wholesale grocer as one of the company's major distributing outlets could be but an oversight. Mr. Bryce readily agreed that quick-frozen foods afforded wholesale grocers unusual advantages and definite means for reinforcing their economic position.

"Unfortunately," he continued, "most of the wholesale grocers have not seen the light of day on this proposition, and it is their failure to visualize the possibilities of this new group of food products that is responsible to a considerable extent for the fact that our wholesale distribution has established itself wherever there was financial responsibility coupled with the necessary facilities for keeping the product in prime condition until it moves into the stocks of a retailer.

"Whether those wholesalers ordinarily sold fish or meat or vegetables or what not was secondary to the question of whether they were willing to warehouse our product in the way in which we knew that it must be warehoused, and sell it in the manner in which we felt it should be sold. It is obvious that quick-frozen products need aggressive merchandising and that the distributor must be alert and willing to step up his entire organization to a point of highest efficiency.

"Moving goods from the point of distribution to the retail store also is a real problem. There are now some trucks on the market that are equipped with mechanical refrigeration so as to deliver the product to the retailer in prime frozen condition. However, few of our distributors use them, as their cost is still high. Furthermore, the true advantage of refrigerated motor trucks can be attained only if retail stores have the necessary

A KANSAS CITY GROCERY reinforces the novelty appeal of frozen fish by reference to the material by which they are refrigerated

equipment to store the quick-frozen foods at the required low temperatures.

"Therefore, if we are to capitalize to the fullest extent the important advantage of being able, through quick-freezing, to deliver a better product to the consumer, it is necessary to study the location and equipment of each distributor and then limit his activities to an area in which he can serve the retailer by available truck service while the frozen product is still nearly, at least, in its prime frozen state.

"Thus we arrive at that which constitutes the most formidable hurdle—the question of the retailer. The very nature of this new type of processed food has demanded that if the advantages and economies of the manufacturing processes are to carry through to the ultimate consumer, existing habits of the food industry can be allowed to prevail only so long as they do not interfere with the orderly processes of economical distribution.

"It does not matter whether it be the butcher, the baker, or the candlestick-maker. Be it a Woolworth store or a florist's shop, if the location of a retail store, or if its appearance, arrangement, degree of cleanliness, or the personality of the proprietor or manager offers no obstacles, our distributors have found that our frozen products can be retailed successfully, and at a profit.

"Obviously, we believe that grocery, meat, and vegetable stores offer the ideal outlets for retail selling of these products. Independent retailers and managers of chains must have a direct and continuous interest in eliminating the losses that result from the perishability of certain foods. The quick-freezing process does this to an admirable extent. We therefore hope that there will be a continually growing interest on the part of food retailers, so that the consuming public may find these food products where it really expects to buy them: namely, in food stores.

"There is, however, a second section to this retail hurdle. Quick-frozen products are rather new to the public. The degree and rapidity of their acceptance is dependent greatly upon suitable displays and particularly upon having the product remain frozen as long as possible. That requires suitable store refrigerators.

"Today there is no store refrigerator in the market that satisfactorily combines capacity for maintaining the necessary low temperatures with the equally important requisites of low cost and economical operation.

"It is the opinion of students of this subject that the development of such store refrigerating units will be slow and gradual. I believe that the ideal unit would be one that provides space for effective display of samples, and has separate sections for the storing of different types of quick-frozen foods as well as other products such as milk and butter, each under proper conditions of temperature. This problem of store units, therefore,

BRAND ADVERTISING appears on the delivery vehicles of distributors

SPECIAL DISPLAYS of this type aid rapid acceptance by the public

is one that must be solved, and the rate of progress in that direction will to a considerable extent determine the rapidity with which quick-frozen foods capture their proper share of the consumer's dollar."

The query for particulars of some of the successful activities in retail selling of Nordic quick-frozen fillets brought out some interesting facts.

Said Mr. Bryce: "We have succeeded in building constantly a greater volume, because we have kept our policy in a state of great flexibility. Aside from adhering to the firm principles that we sell only to wholesale distributors, we have adapted the type of our co-operation in building retail sales to the respective community.

"We have used in active service nearly every style and type of refrigerating cabinet that seemed to promise reasonably satisfactory service and the necessary economy in operation. Co-operation in advertising and sales promotion was individually designed to fit the particular needs of the distributor in each territory. The results obtained naturally were more satisfactory in some sections than in others.

"In one city in the Middle West where we have been distributing for about three years, the consumption of Nordic fillets alone has reached the rather surprising total of 4 lb. per capita per year and in the same city we sell Nordic whiting—a fish that is frozen but not filleted —at the rate of 1 lb. per capita. That, then, makes five pounds of our fish per capita.

"According to statistics, there are 17 lb. per capita of fish consumed in the United States, which, after the waste portion has been deducted, would mean about 8½ lb. of edible fish. Thus, in this particular city, quick-frozen fish has captured over half of what is considered the average total market.

"Of course," continued Mr. Bryce, "I do not mean to imply that such results have been obtained in many

places, but there is every reason to believe that similar satisfactory results can be achieved in many other places."

Mr. Bryce then was asked to summarize what he considered as indispensable and prime essentials to the successful production and distribution of quick-frozen foods.

"The Atlantic Coast Fisheries Company," he replied, "obtains its raw products direct, without broker or commission man to get an in-between profit. Its manufacturing processes are considered examples of efficiency, so that practically nothing is wasted. Our distribution is built on the basis of similarly rigid requirements of efficiency and waste-elimination. Distributors, wholesalers and retailers are selected not according to their particular line of trade but strictly on the basis of their ability to function economically.

"This business of quick-frozen foods holds great promise only in exchange for great and untiring effort. It makes possible unprecedented economies both in production and distribution, but demands unprecedented care as its price. The savings that are effected through transporting only the edible portions of food are partly absorbed by the increased cost of effective refrigeration.

"The profits that accrue from the sales of byproducts must be re-invested in constant research work. The ability to maintain uniform standards of quality and a stabilized schedule for economical production is achieved only at the price of eternal vigilance in the search for new sources of the raw products.

"Those concerns that contemplate entering the quick-frozen food field should have, first, due regard for the very substantial difficulties presenting themselves in the matter of production, transportation and store refrigeration, which difficulties must be surmounted and overcome *en masse,* so that quick-freezing may accomplish the greatest of all its advantages: namely, the virtual total elimination of perishability.

"Aside from that, they must assure themselves that they can do one of these things:

"1. Deliver a better product to the consumer.

"2. Deliver a product as good as those preserved by some other methods but at equal or lower cost.

"3. Deliver to the consumer a satisfactory product which at certain seasons they could not deliver, or be able to deliver a product to certain sections of the country to which it otherwise might not be delivered at all.

"They must study the result of quick-freezing upon the proposed product and what changes, if any, occur in the product during storage. This may not be the mere observation of the quick-frozen product shortly after it is packed, but must include periodical study until the product has been under observation during the maximum period required for practical commercial distribution. These observations must be made with a view to learning the facts, to the end that, where necessary and if possible, a method of processing will be devised whereby there will be a fixation of nutrition and natural flavor of the product.

"Having done this, or coincident with doing it, they must study carefully the method of packaging, both as to the inner and outer package, until a proper method for their particular product has been developed. In the experience of the Atlantic Coast Fisheries Company methods that are satisfactory for one product may be entirely unsatisfactory for another. Having produced a satisfactory product, they must study the conditions and methods of storage necessary at the packing or manufacturing point.

"The newcomers must next contemplate the problems of distribution, the simplest of which perhaps is to move the goods in car lots from the point of packing to central distribution centers. They must next consider problems of retail distribution of the quick-frozen product, and herein lie the difficulties that may be more difficult to surmount, that may entail great length of time and heavy expenditures.

"The study, after all, resolves itself into one of determining whether there is a real advantage in quick-freezing the product. For instance, is there an advantage in freezing peas, which now can be delivered in excellent fresh condition all over the United States at almost any time of the year? Obviously, the only advantage that can come from freezing such peas is to freeze them during peaks of production, when prices are low and the fresh market cannot absorb the peas, and then only if a more satisfactory product can be delivered to the consumer than by some other method of preservation, such as by canning, and that at a comparably acceptable price to the consumer.

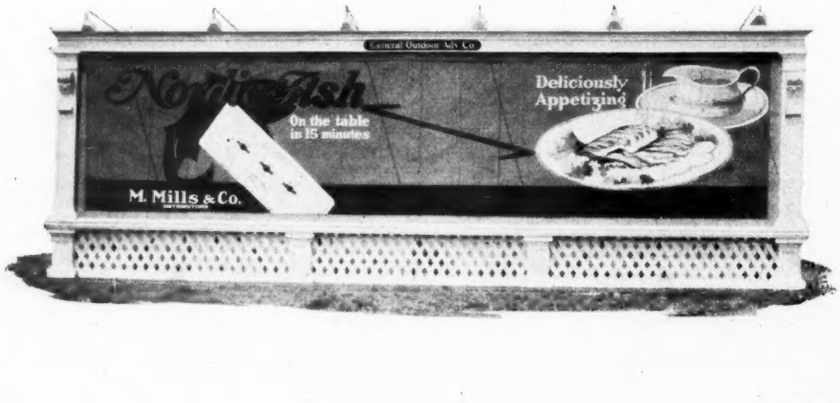
"To sum up, the advisability of quick-freezing seems to be determined by the answers to the following questions:

"1. Can a better product be delivered to the consumer?

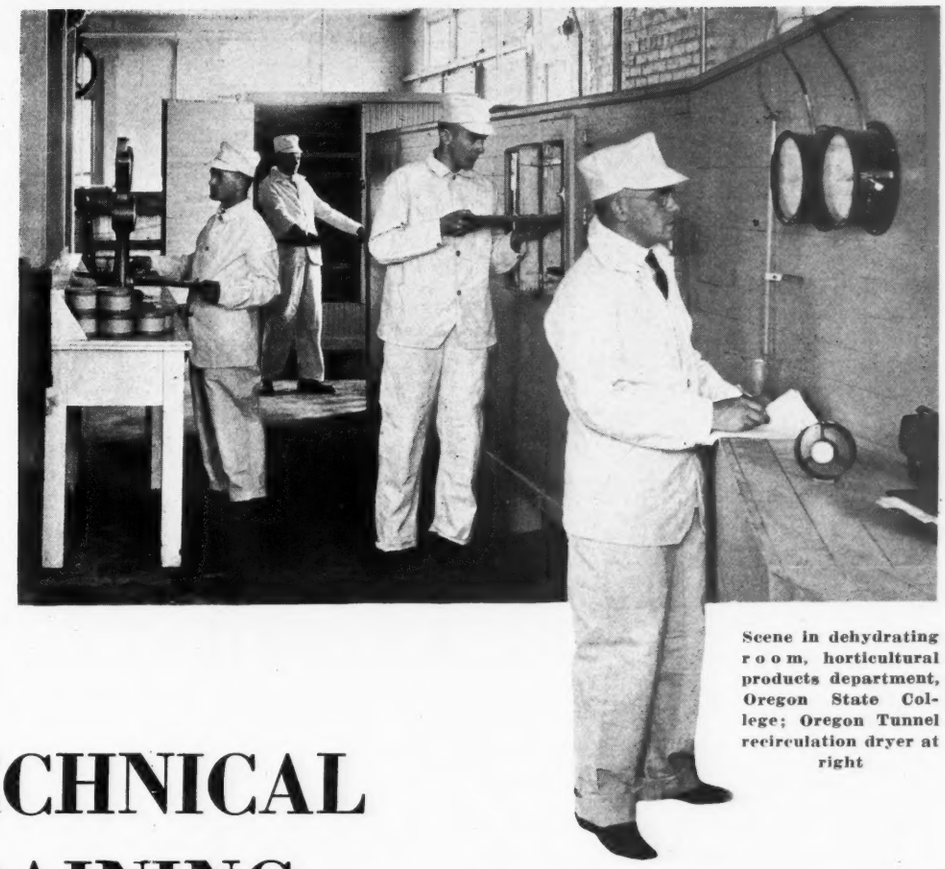
"2. Is there an economic advantage in quick-freezing?

"3. To what degree can the perishability of the product be limited?"

Obviously Mr. Bryce has a sincere desire to prevent the possibility of hailing the quick-freezing process as a veritable panacea for the troubles ordinarily encountered in the preservation and distribution of perishable foods, and for that reason he has frankly stated the difficulties that must be surmounted before distribution of quick-frozen foods can be undertaken with reasonable assurance of having it prove a profitable venture.



ALL FORMS of advertising are used to bring the frozen fish to public attention



Scene in dehydrating room, horticultural products department, Oregon State College; Oregon Tunnel recirculation dryer at right

Fitting TECHNICAL TRAINING *To the Needs of the Pacific Coast*

By JOHN C. BURTNER
Corvallis, Ore.

THE EXTENT to which science keeps in advance of public opinion is no better illustrated perhaps than by the fact that even today a wag is always sure of a laugh by referring to the wife who keeps house with a can opener. In view of this situation it is a matter of considerable gratification to the canning industry that one public educational institution more than a decade ago saw the trend toward more systematic and scientific food preservation and established comprehensive experimental and instructional work in this field.

This institution is Oregon State College, at Corvallis, which as yet gives the only four-year degree course in horticultural products to be found in the country. The department of horticultural products, housed in its own separate building, has in the last ten years taken the lead in Northwest research in food preservation, while maintaining and expanding its instructional work.

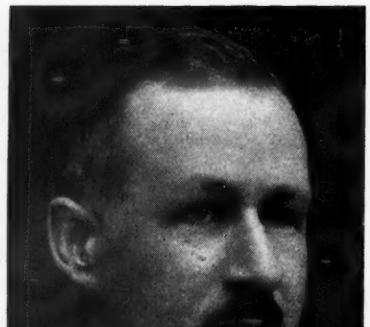
It also carries on a unique project in adult education: a commercial canners' short course. The ninth annual session of this canners' school was held in February with an official paid registration of 68, which exceeded that of any previous year. The enrollment, moreover, included representatives of between 55 and 60 Western commercial canning plants.

The idea of this canning short course was conceived in 1921 by E. H. Wiegand, at that time and still head of the horticultural products department. As announced at that time, the course was designed to give practical canners the advantage of the latest developments in scientific canning, including production problems, machine management, and the underlying principles of chemistry and bacteriology. Building on this basis, Professor Wiegand has enlarged and modified the short-course programs from year to year, always in close co-operation with the leaders in the canning industry, until the material now presented bears more directly than ever before on the present problems of the canners.

The 1930 course ran for three weeks, the first being devoted to double seaming, or can-closing, training under the immediate supervision of specialists of the American Can Company; and the second and third weeks to a methods course for canners. The training in double seaming is carried out in the commercial canning laboratory of the department, in which the students use machines of the latest types, installed by the American Can Company. The machine course continues through the entire three weeks, students being permitted to devote all their time to it or to divide their work during the final two weeks, taking some of the program provided

for the cannerymen proper. New this year was training on the latest type of vacuum sealing machines, one of which has since been installed in the laboratory by the manufacturers on an indefinite loan for research work and for use in connection with education.

The two-weeks work in actual canning methods has been augmented in recent years by a regular food-judging contest, which continues throughout the course. By actually judging the canned products of all grades and conditions the students learn more effectively the results of applying, or failing to apply, the principles given in the lectures and demonstrations. As now organized, each day in the two weeks is devoted to a specific subject, such as stone fruits, pome fruits, fresh products, berries, frozen fruits, corn and peas, carrots and beets, and others. Subjects covered on most of them include methods of improving the pack, how to judge the products, grading for canning, types of grower contracts, general results of investigations, labor problems, buying, and even many practical production problems, which are handled from day to day by specialists of the extension service and experiment station.



E. H. WIEGAND
Head of the department of horticultural products at Oregon State College

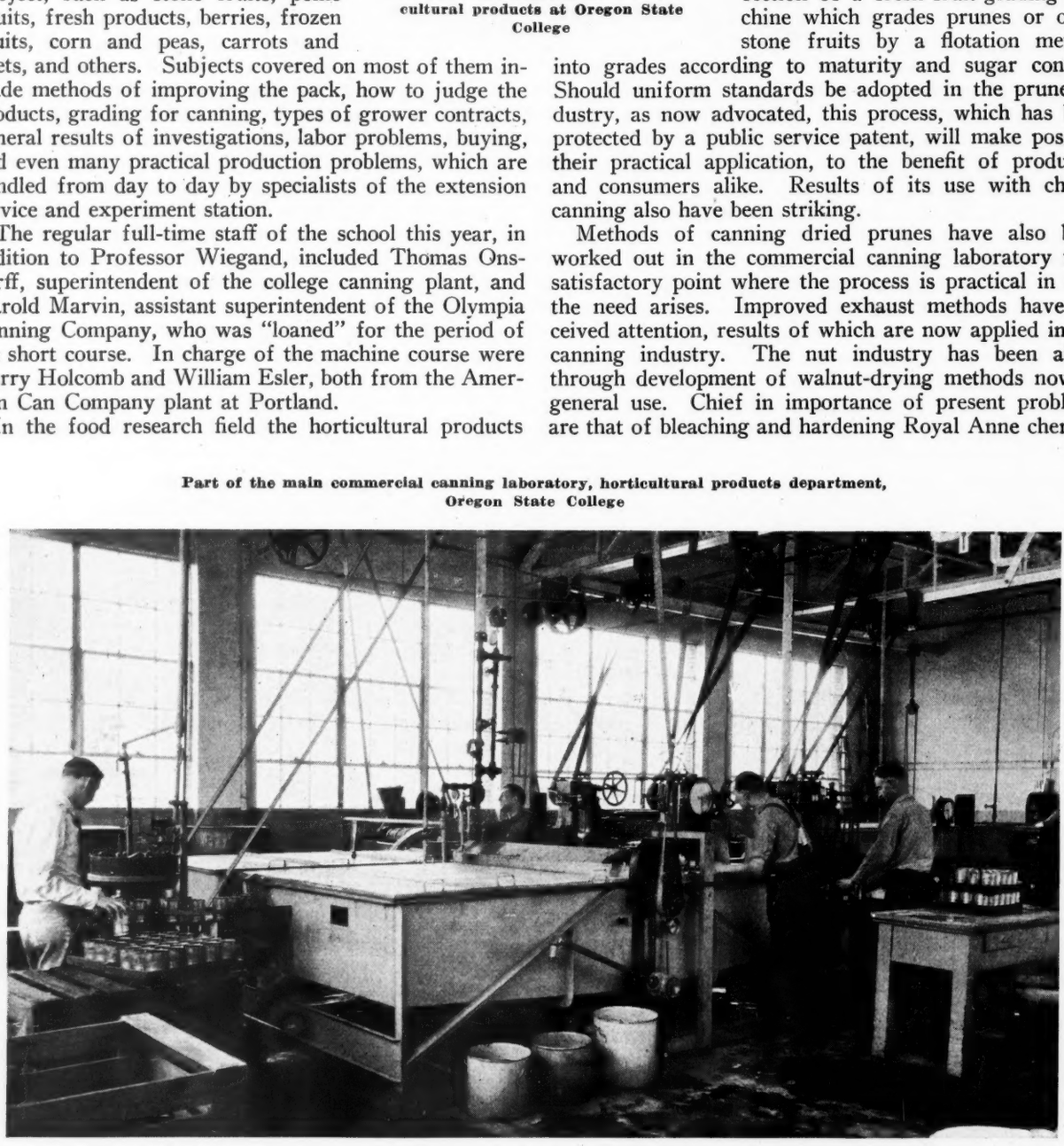
The regular full-time staff of the school this year, in addition to Professor Wiegand, included Thomas Onsdorff, superintendent of the college canning plant, and Harold Marvin, assistant superintendent of the Olympia Canning Company, who was "loaned" for the period of the short course. In charge of the machine course were Harry Holcomb and William Esler, both from the American Can Company plant at Portland.

In the food research field the horticultural products department at Oregon State College is a source from which the industry has obtained many new and successful developments. One of these was the development some years ago of the Oregon tunnel recirculation fruit dryer, which greatly increased the efficiency of the dryers for prunes and other products while materially enhancing the quality. This type of dryer is now standard throughout the Northwest and also has been introduced with but slight modifications in appropriate establishments located in a number of foreign countries.

The department has also been a constant advocate of better quality standards in dried prunes and other processed fruit. The most recent contribution toward this end is perfection of a fresh-fruit-grading machine which grades prunes or other stone fruits by a flotation method into grades according to maturity and sugar content. Should uniform standards be adopted in the prune industry, as now advocated, this process, which has been protected by a public service patent, will make possible their practical application, to the benefit of producers and consumers alike. Results of its use with cherry canning also have been striking.

Methods of canning dried prunes have also been worked out in the commercial canning laboratory to a satisfactory point where the process is practical in case the need arises. Improved exhaust methods have received attention, results of which are now applied in the canning industry. The nut industry has been aided through development of walnut-drying methods now in general use. Chief in importance of present problems are that of bleaching and hardening Royal Anne cherries

Part of the main commercial canning laboratory, horticultural products department, Oregon State College



for use in making maraschino cherries, and that of perfecting frozen-fruit-process methods.

The frozen-fruit industry, particularly, holds considerable promise for the fruit producers and the consuming public. For a number of years this method of preservation has met with real success and for two years products have been placed on the market in packages suitable for the retail consumer trade. Even under present conditions, expansion of the method is limited more by lack of retail refrigeration equipment than by any shortcoming on the part of the product. Investigations in the cold-pack method by the college have to do with manner of freezing—whether in natural state, with sugar or sirup—temperatures for freezing and storage, types of packages, and related problems. In speaking of cold pack berry freezing during the recent short course, Robert Ireland, of the Terminal Ice & Cold Storage Company of Portland, concluded a discussion of his several years' experience by saying: "There are many things to learn about the cold packing of fruit and I am pleased to know that Oregon State College has taken the proposition in hand; it will mean much to the state, as we believe the cold-pack industry will become a national necessity."

The work of the horticultural products department is carried on in a substantial, three-story, brick building, containing both technical and commercial laboratories and classrooms. Nearly $50,000 in equipment is either owned by the department or placed with it by equipment companies on indefinite loans. The main commercial laboratory is equipped with modern canning and preserving equipment and is used throughout the summer as a small cannery, employing a crew of about twenty during the main season. The output is disposed of almost entirely to the college dormitories or to other state institutions. Operation on this commercial scale permits running many valuable experiments that otherwise would be impossible. One large section of the lower floor is devoted to dehydration work and is equipped with a tunnel recirculation dryer and necessary machinery. Next to it is a small specialty-foods laboratory that is utilized for small-scale processing, mostly on an experimental basis.

Another laboratory on this floor is the chemical room, where considerable testing equipment and supplies are kept for immediate use, though the general agricultural chemistry laboratories are available for use by students or staff of the department. One laboratory on the basement floor is devoted to making and processing fruit juices and various carbonated drinks. The department recently started the only college course given in the country in manufacture of carbonated drinks. This laboratory is well equipped with extractors, clarifiers, carbonating machines, and bottling equipment. The third floor of the building is occupied chiefly by offices and classrooms. The building is equipped with its own steam heating plant, this also serving to supply steam for the canning plant.

For students planning to enter the food-processing industry as a profession, the department now offers full four-year curricula designed to fit the graduate for the canning, preserving or pickling manufacturing, or for related positions as food buyers, salesmen, brokers, inspectors, and food chemists or other research workers. These curricula, at present unique in their comprehensiveness, combine thorough undergraduate technical training with supplementary work in production, business, and a number of liberalizing subjects. In addition, graduate study is available with opportunity to conduct original research on any of many practical problems of immediate concern to the industry. Recently a two-year, non-degree curriculum has been arranged, which includes much of the practical training afforded in the full course but omits enough of the more technical and liberalizing subjects to permit completion of the work in the reduced time. Graduates of this department are already scattered throughout the world, from India to China and South Africa. Many others are employed in this country, and practically all the leading canning companies in the Northwest have one or more graduates or ex-students of the college on their staffs.

It is said that the final test of the practical worth of any educational or research institution closely connected with any industry is in the reaction of that industry to it in the form of confidence expressed and co-operation extended. If this be so, then the horticultural products department has "arrived," for certainly no industry could afford better support than is now received from commercial firms, both small and large, located in one of the world's most important food canning and processing regions.

Personal instruction on operation and repair of one of the new vacuum sealing machines used in the short course for canners at Oregon State College

Economical Materials Handling Features GELATINE MANUFACTURE

PART I

By C. R. McKEE
Assistant General Superintendent,
U. S. Gelatine Company,
Milwaukee, Wis.

BECAUSE of the rather spectacular fact that the manufacture of 1 lb. of gelatine requires about 10 lb. of coal and 1,000 gal. of water, one is by no means surprised to learn that materials handling is one of the more important functions in the operation of a large gelatine factory. Indeed, success in this industry depends to a very great extent on the economy with which huge quantities of materials can be handled.

With a daily manufacturing capacity of 15,000 lb. of gelatine, it will readily be seen why a plant of this size, in order to be able to function at all, must be located adjacent to a plentiful source of pure water, for when operating at capacity the plant will use each day from 1,500,000 to 2,000,000 gal. of Lake Michigan water. An additional item of importance in the proper location of a gelatine plant is that it should be in a region affording a minimum of wind-blown contaminations, such as dust and smoke. The location of a gelatine plant near its source of voluminous raw materials is an economic feature that also is highly desirable. Climate, also, has a bearing upon the desirability of a manufacturing location, for cool weather in the summer time contributes to manufacturing economy.

Essentially, gelatine manufacture consists of boiling a suitable raw material in water to dissolve the gelatine, after which the solution is concentrated by evaporation to a rather thick consistency, then allowed to congeal, and next dried. Although apparently a simple series of operations, one soon realizes that many complexities enter the process.

Raw materials for edible gelatine are of three types: bones, pigskin, and calfskins. The gelatine produced

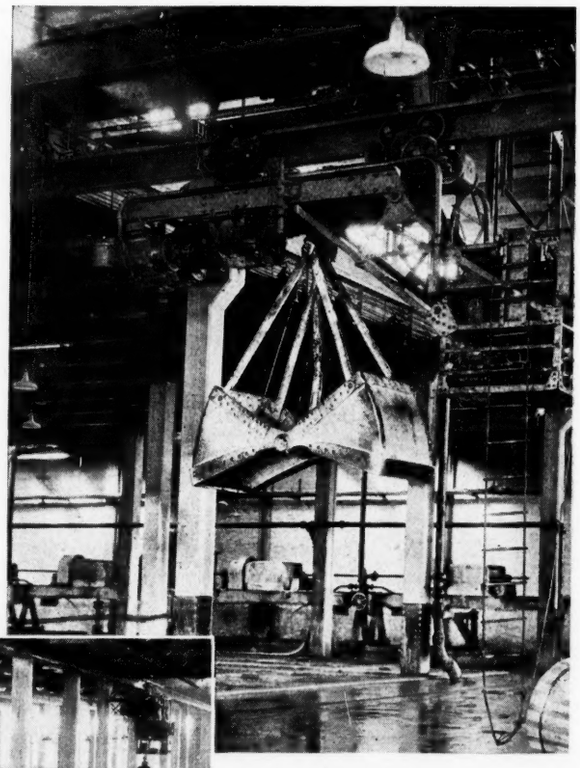


Fig. 1—Wooden vats in which the washed raw material is treated with lime liquor. All materials are handled in and out of the 660 vats in this building by an overhead crane.

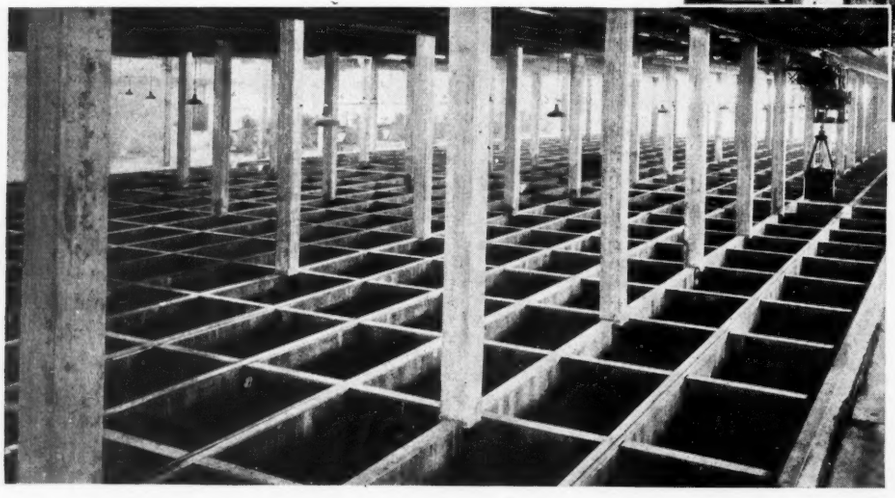


Fig. 2—The crane and its clamshell bucket on the transfer crane—a sort of supercrane that carries the traveling crane from track to track at one end of the building. Thus any vat or wash mill in the plant can be served by a single unit.

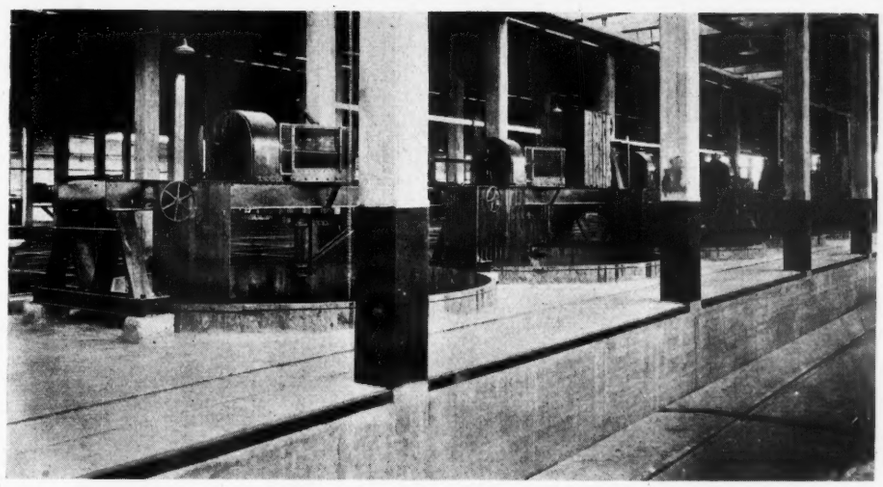


Fig. 3—Wash mills or cone mills are located on both sides of the vat house. Note the railroad siding with depressed tracks, where the raw material enters the plant.

from each of these materials has its own individual characteristic properties. The U. S. Gelatine Company utilizes calfskin trimmings exclusively for its raw materials. The material is received in box cars which are run into the large building, shown in Figs. 1 and 3, and is unloaded by hand. The calfskin trimmings are conveyed to cutters which shred and cut them into pieces, usually about 3 to 6 in. long. The rotary cutter throws the skin into a pile, and at this stage all hand operations cease, except in a single place where mechanical devices have never yet been developed to do the job.

A traveling crane, shown in Fig. 2, picks up a clamshell-bucket full from the pile and drops it into a wash mill, sometimes called a cone mill. Wash mills are wooden tanks sunk in the floor with about 2 ft. of their sides projecting above the floor level (see Fig. 3). The first step of the process is washing the material with a tremendous quantity of fresh water. In the wash mill is a fabricated wooden cone about 12 ft. long and 3 ft. in diameter at its outer end. By dragging the corrugated cone around the tank in a circular path, the hide or calfskin pieces are kneaded or rubbed in the water, which flows in at the center and out through screens on one-half of the periphery. Usually the washing operation lasts for a period of about 12 hours, at the end of which all of the salt that was used in the skins as a preservative has been dissolved, so that nothing more can be removed by further washing.

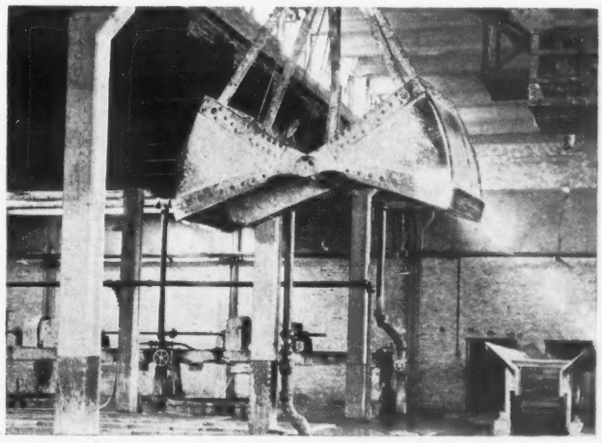
A load of the washed raw material is then dumped into one of the liming vats, by means of the traveling crane, of which there are 660 in this building. They can be seen in Fig. 1. The liming operation, one of the most important steps in the manufacture of gelatine, requires a period of 8 to 12 weeks for its completion, during which it is necessary from time to time to transfer the hides or skins into other vats containing fresh lime liquor. In this service the overhead traveling crane is absolutely indispensable, for it will perform in a few seconds the work that otherwise would take several men a period of an hour to accomplish. An important feature of the liming room is the design of the hood vats, with their overflow and drain outlets, so that a bucket may be lowered into them without missing very much material. When fully extended, a clamshell bucket will almost fill the area occupied by a vat.

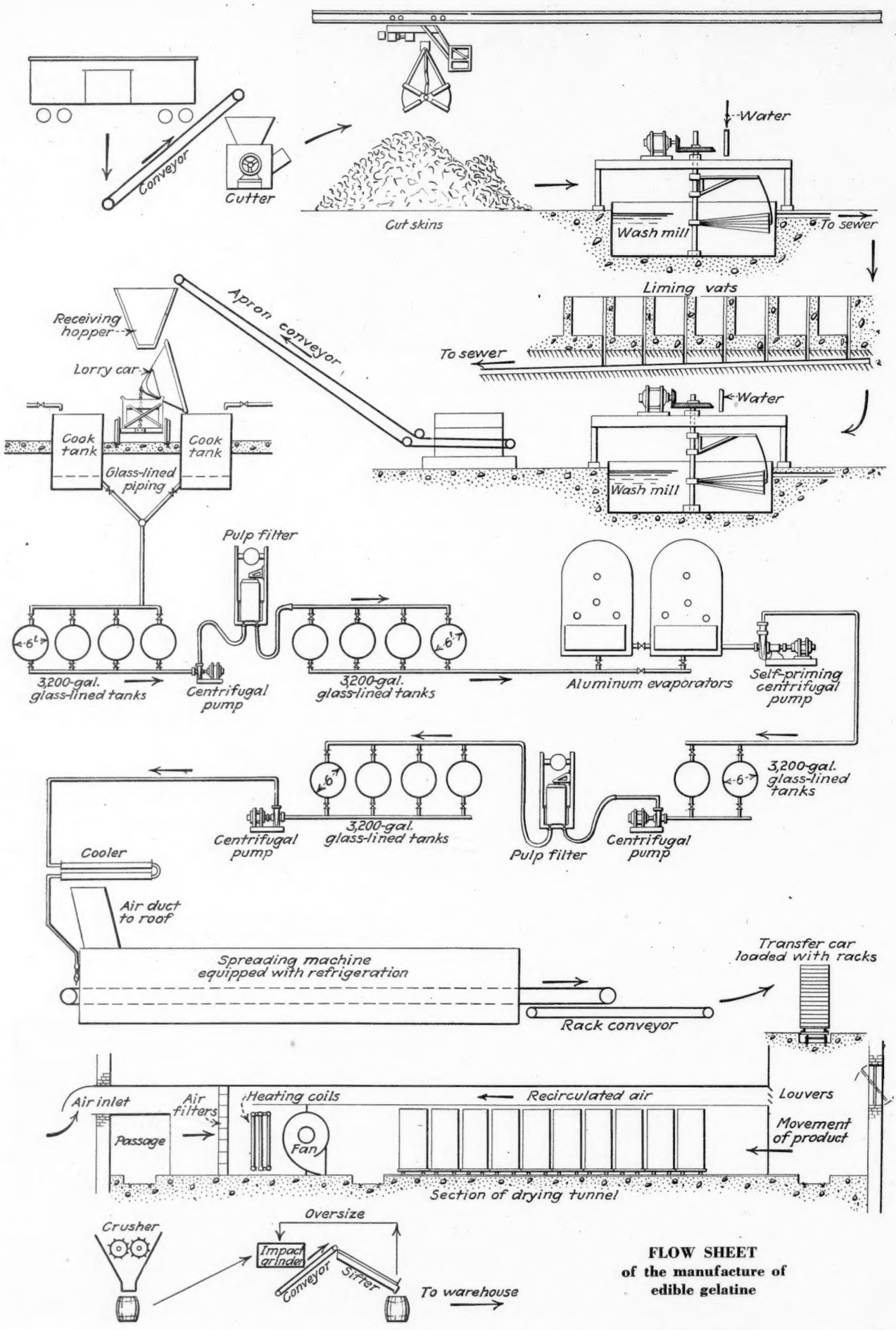
In liming operation, two purposes are attained, the more important of which is to cause a swelling of the colloids of the calfskin and remove the non-gelatine forming material. The lime liquors are prepared in a central lime-slaking room and forced to the vats by means of open-impeller centrifugal pumps.

After the 8 to 12-weeks' liming period, the crane lifts the limed skins from the vats and deposits them in a second set of wash mills at the other end of the building. By this time the skins have become plumped or swollen until they are quite blubbery. Fresh water is run in these twelve wash mills and the cones are revolved until all traces of the lime are removed from the skins. They are still somewhat alkaline and require neutralization in order to get them into proper condition for further working. Hydrochloric acid is added to the tank until the proper pH is attained. This pH corresponds to the isoelectric point of the colloids of the calfskins, for, as is well known, the impurities of colloids are most easily washed out at the isoelectric point. The washing is continued until chemical control determines when it shall stop. The raw material is now ready for the cooking operation.

The traveling crane next lifts the prepared material from the final wash mills and transfers it to a large apron conveyor, shown at the lower right in Fig. 4. This conveyor elevates the material to the third floor of the plant, where the cookroom is located. As can be seen in Fig. 5, the cookroom is built with a monitor to facilitate ventilation of the steam which arises from the cooking

Fig. 4—When the limed skins are fully washed in the wash mills at the left, they are lifted out by the crane and deposited in the hopper of the apron conveyor shown at the right. From this point they are mechanically conveyed to the cook room on an upper floor.





FLOW SHEET
of the manufacture of
edible gelatine

tanks, and is provided with forced ventilation, warm air being used to prevent fog.

The plumped skins coming up from the first floor on the apron conveyor fall into a large steel hopper car which acts as a reservoir. There must be no long holding here, however, because in its present condition it is very easily possible for the material to spoil bacteriologically, and promptness of subsequent handling is essential. The raw material is transferred from the hopper car to the cooking tanks in the lorry car shown in Fig. 5. This is merely a small self-dumping car, built to dump either to the right or to the left, as suits the will of the operator. The 48 cooking tanks are arranged into four parallel rows, with a lorry car running between each pair of rows.

The arrangement of the tank itself and its preparation are matters of importance. Essentially, the cook tank is nothing but a cypress tank with a steam cross at its bottom, as shown in the flow sheet. The draw-off line is taken out at one side of the tank, a procedure that is somewhat different from the custom when using wooden tanks, but it has the advantage of avoiding openings in inaccessible places on the bottoms and leaves the outlet in a get-at-able place on the side. Eight inches above the true bottom of the tank is located a false bottom. The tank outlet is between them. Between the two bottoms

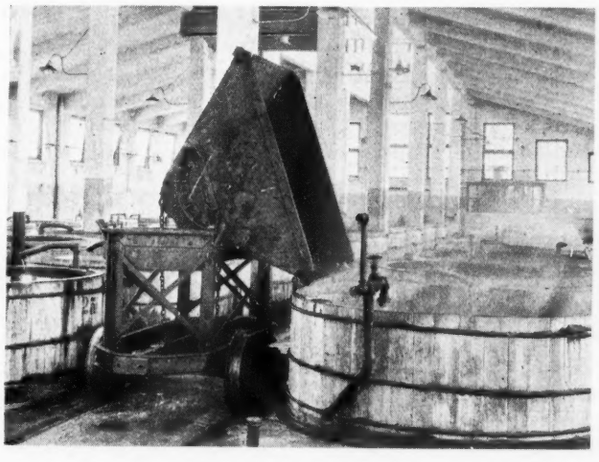


Fig. 5—The lorry car has just dumped a charge of the prepared raw material into the cook tank on the right. Note the comparative freedom from fog in the cook room through the use of warm air as a preventive. The outside temperature was zero on the day this picture was taken.

is loosely "packed" a bale of excelsior that previously has been carefully boiled in water in order to remove all of the resins and possible flavors from the wood. In preparing the tank for use it is "packed" in the manner indicated, a measured quantity of water is run into the tank and brought to the temperature of 120 deg. F. by steam admitted through the cross, and the proper amount of washed skins is added. It is held at a temperature of 160 deg. F. for 5 hours, and the finest quality of gelatine immediately begins to dissolve from the raw material. Several successive runs—so-called—are taken off, each one being at successively higher temperatures but that which comes off first is considered to be of the highest physical test.

Gelatine being essentially dissolved skin, and since the skins have been put through the foregoing elaborate cleansing process, there remains a comparatively small quantity of residue on the cookers. This residue is

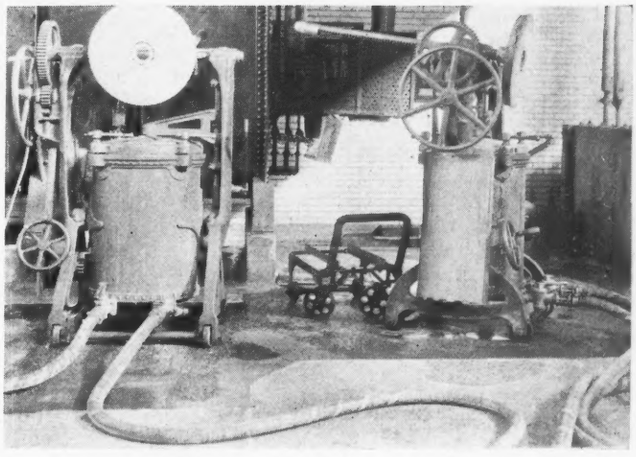


Fig. 6—Filtering the gelatine liquors before evaporation in Blitz Blank beer filters. Note the use of rubber hose for flexible connections. Sight glasses in the lines are clearly visible on the right-hand filter. The apparatus atop the filters are rams for packing the filter-mass in the cylinders. In the left rear is the pulp-washing machine.

removed by hand and the tank thoroughly cleansed and drained through a large flush valve.

At this plant four different runs, or cookings, of gelatine are made from each lot of skins in a cooking tank. It is essential that all of them be kept separate in the subsequent manufacturing operations, which will account for the rather large number of glass-lined steel tanks that are found in the evaporating department, in which temporary storage of the different lots must be made. As each lot of cooked gelatine is drawn off it runs through a glass-lined pipe into a 5-in. glass-lined header that in turn flows into a 6-ft., 3,200-gal. receiving tank in a battery of four such tanks. Every lot of gelatine which comes through must be kept individually separate all the rest of the way through the factory, and a bonus is paid to the employees or they are penalized, depending upon the quality of the material which they have produced.

From the receiving tank a centrifugal pump forces the warm gelatine liquor through an ordinary Blitz Blank beer filter, or so-called pulp filter, a practice that has been borrowed from the old brewing industry. The pumps are 1½-in., motor-driven centrifugals, capable of building up a pressure as high as 40 lb. per square inch when the filter-mass becomes clogged. In Fig. 6 are seen a pair of the portable beer filters, mounted on rollers. Connections with the filters are made by means of rubber hose. It will be observed in the right-hand filter of the two, shown in Fig. 6, that a glass section is inserted in the tube, so that it is possible for the operator to see at all times whether or not a clear liquid is coming through.

One of the characteristics of a gelatine solution is that it will solidify into a jelly-like mass on cooling, a feature that makes it necessary to keep everything moving while it is still warm. For that reason, if a filter should go bad by virtue of a short-circuit somewhere through the filter-mass, a second filter is used, in "series" with the first, and the centrifugal pump has sufficient pressure to push it through both of them. The filter-mass is high-grade paper pulp that can be washed and re-used for this purpose, over and over again. In the background of Fig. 6 can be seen the washing apparatus for removing impurities from the filter-mass.

The Production and Place of

LACTIC ACID

By WILLIAM EISENMAN
New York City

LACTIC ACID was found in soured milk (*Lactis*) by Scheele in 1780. For the ensuing 50 years, chemists thought that this new acid was an impure acetic acid. J. Berzelius found lactic acid present in almost every fermentation he attempted. He disagreed with those before him, declaring as a result of his work on the acid, that it was not an impurity, but a distinct definite compound. In 1833, Jules Gay Lussac and J. Pelouze reported in the *Liebig Annalen* their work on this acid and by analysis definitely established its composition. At the same time, J. Von Liebig and E. Mitscherlich proved from analyses of lactates that lactic acid was a definite, distinct organic acid. In 1850, K. Strecker reported in the *Annalen* its synthesis from amino-propionic acid by the decomposition with nitrous acid. In 1857 Pasteur, in his famous work on bacteria, established the fact that lactic acid is obtained as a result of fermentation of a sugar solution by various bacilli. He is the discoverer of the lactic-acid bacilli. In 1863, J. Wislicensus reported in the *Annalen* of his synthesis of lactic acid from acetaldehyde by the cyanhydrin reaction.

Pasteur's opening of the bacteriological field led the followers of this leader in the right direction, and in the latter part of the nineteenth century the methods of pure culture isolation were developed, rendering possible the identification of the bacilli responsible for the lactic-acid fermentation. In 1895, Wehmer succeeded in obtaining a pure culture of a lactic-acid-forming bacillus.

Of the organic acids found naturally in foods, lactic is the least in quantity. Citric, tartaric, and malic are present in fruits in considerable quantities, but lactic and acetic appear only when fermentation has set in. This step in the downgrade portion of the life cycle of our food-producing plants finds mention in the Bible, and no doubt older civilizations knew and practiced fermentation. It is quite possible that even our prehistoric ancestors knew that the juices of fruits will ferment when collected and allowed to stand. However, it remained for Pasteur to find out the true mechanism of fermentation. We know that any carbohydrate is subject to this breaking-down process, but the fermentation industries have found that sugars are the easiest to work. In practice, the sugar solutions are prepared from starches, either by malting or by inverting cereal starches or potato starch, with the one outstanding exception that the alcohol industry uses blackstrap molasses—a byproduct of cane-sugar production.

In every fermentation of sugar the molecule is acted upon and decomposed into a simpler compound. A given species of bacteria, yeast, or mold will always give the same fermented products. Within the cell of each microorganism there is contained an enzyme or ferment, and it is this complex agent that effects the breaking down of the sugar molecule. The 21 bacilli capable of producing lactic acid were named by W. Henneberg. They are found on cereals, potatoes, fruits, in milk, and, of course, in the air and soil. For the commercial preparation of lactic acid, the type found on cereals generally is used. This type is known as *Bacillus delbrüki*. It can produce lactic acid from most sugars, with the exception of lactose and the lesser known sugars, such as arabinose and raffinose.

The manufacture of lactic acid is a highly specialized practice, employing the following general procedure: A mash is made containing about 12 per cent of sugar in solution, with the necessary quantity of protein and mineral salts. This mash is heated to a boil in a wooden tank equipped with a stirring device, and sterilized for an hour at that temperature. The mash is then quickly cooled to about 50 deg. C. and inoculated with a previously prepared pure culture of the bacillus used. In about 6 hours the mash is in full fermentation, the temperature rises slightly, and the acidity of the mash increases. The bacilli have to be kept in slow motion by stirring. Periodically, a calculated quantity of milk of lime is added to neutralize part of the acid formed, for a 2 per cent lactic-acid content in the mash arrests the activity of the bacilli. After a 10-day period all the sugar has been converted to lactic acid, and the tank now holds a solution of calcium lactate. This solution is boiled to kill the bacteria and then acidulated with the exact quantity of sulphuric acid, and after cooling, the calcium sulphate so formed is filtered off. The solution is about 20 per cent lactic acid and it is the practice to concentrate this to about 45 per cent strength. This is the grade generally used in the food industries.

THE acid solution is of light straw color, has no odor, and is of a pleasantly sharp, acid taste. It is miscible in all proportions in water and alcohol. It is only slightly volatile on boiling a solution. In pure form it is a sirup, much like glycerine, though the crystalline form is known. It combines with nearly all the metals to give the lactates, which are all very soluble. It forms pleasant smelling esters with most of the alcohols. The alkali lactates have the property of aiding the emulsification of oils in water. The hydroxyl group gives to lactic acid certain alcoholic properties that the other edible organic acids do not have. Because of the presence of this group it dissociates more readily when dissolved in water. An alphabetical list of its many uses in the food industries is given below;

although the list is representative, it cannot be considered complete.

Bread—A constant source of worry to the bakers of bread is the fear that the bread will develop the malady known as "rope." W. Henneberg reports in his work on that bread disease that *B. mesentericus* is responsible for this formation, that he has isolated this bacillus from flour samples, but has never succeeded in finding any present in yeasts. *B. mesentericus* grows and multiplies rapidly in a slightly alkaline condition, but at a pH of 5 the growth is arrested. In practice, about a pound of 50 per cent lactic acid per barrel of flour has been found sufficient to check this development. In addition to this most important use, investigation on the baking of bread has revealed that a certain degree of acidity of the loaf has a beneficial effect on the physical state of the gluten. Growth and activity of the yeast is enhanced also by a proper degree of acidity. Recently, some work was done by the writer on the use of sodium lactate as a deterrent of mold on white bread, and the results warrant the report that sodium lactate improves the keeping qualities of bread.

Because bread is digested in an acid medium, and the natural acidity developed in dough is small, the addition of the foregoing quantity of lactic acid serves a triple purpose: it will definitely prevent the rope-forming bacteria from activity, help in giving a better loaf, and a more digestible bread.

Baking Powder—The calcium salt of lactic acid has found use in making baking powders. It has the advantage of being a slow-rising powder. The byproducts of calcium lactate and bicarbonate of soda are sodium lactate and calcium carbonate, both indisputably harmless. Harvey W. Wiley has a patent in which lactic acid in milk, dried to a powder, is used with baking soda.

Beer and Spirits—Where the brewer and distiller of grain does not want to be troubled with the use of a pure culture of lactic-acid bacilli in his mashing-in, his practice is to use about 5 pints of the 45 per cent lactic acid for every 50 bbl. of water used. This gives him the proper degree of acidity to prevent the growth of foreign yeasts and molds and to give a cleaner fermentation.

Milk Products—In general, the dairy industry makes its own lactic acid when it desires to prepare such products as buttermilk, sour cream, and bottled brands of fermented milks. The natural fermentation that takes place in milk changes the lactose (milk-sugar) to lactic acid. In making cheese from skimmed milk, lactic acid is finding an increasing use. The curd formed by this acid has a finer grain, the whey filters faster, and the finished cheese does not weep. In addition, the whey has gained in fodder value because of the presence of calcium lactate.

Jams and Jellies—Very few of the producers of preserves use lactic acid, but its marked blending properties with the essential oils in fruits and fruit juices should bring lactic acid to its deserved place.

Olives—In FOOD INDUSTRIES, February, 1930, there is an article by Ayers, Barnby, and Voight. They found that lactic acid in the concentration of 0.5 per cent stopped the growth of micro-organisms and prevented clouding of the olive brine.

Pickles and Sauerkraut—The lactic-acid bacilli naturally present in vegetables give the lactic fermentation in these products. The lactic acid formed aids in keeping the pickled vegetables sound.

Salad Dressings—Although the acid generally used in these preparations is vinegar, lactic acid may find a place here, because of its comparative mildness in taste and because of its emulsification qualities.

Carbonated Beverages—Certain well-known dry ginger ales use lactic acid to speed the ageing and blending process that this drink must undergo.

Yeast—In the growing of yeast, the practice is to start the wort or mash by inoculating with a pure lactic-acid culture and allowing the lactic fermentation to proceed to a certain acidity, and then inoculate the yeast growth.

Miscellaneous—Patents have been granted for the use of lactic acid as a preservative in the packing of egg yolk, and it has been suggested that lactic acid would aid in the prevention of rancidity in edible oils, especially where their use is for salads. Certain specially prepared infant foods use lactic acid.

▼ ▼ ▼

Cottonseed Meal Is Rich In Vitamin G

COTTONSEED MEAL, commonly used as a cattle feed, has been found to be a substance rich in vitamin G, the anti-pellagra vitamin, and by far the cheapest source of this vitamin, according to an announcement by Dr. W. W. Skinner, of the Bureau of Chemistry and Soils, U. S. Department of Agriculture. Results of nutrition studies on cottonseed meal for the last year were reported recently before the American Oil Chemists' Society at New Orleans, La., by Henry Stevens, who has been in immediate charge of the work. The studies are being conducted jointly by the Department of Agriculture and the National Cottonseed Products Association.

"In addition to being rich in vitamin G, Stevens found cottonseed meal to be an important carrier of vitamin B, the anti-beriberi vitamin," Dr. Skinner said. "Yeast is considered by chemists to be the richest known natural source of these two vitamins, and the work of Stevens has demonstrated that commercial cottonseed meal, even in the unrefined state, is the only substance that even approximates yeast as a source of these vitamins. Yeast is now used as a specific in the treatment of pellagra, but the cost of yeast is high to sufferers from the disease."

Stevens used rats in his first tests of the nutritive value of cottonseed meal. The results indicated that this meal is an unusually rich source for vitamins B and G, and this unexpected discovery led him to further studies in an effort to determine how the vitamin content of cottonseed meal compares with other materials. This work led to the conclusion that cottonseed meal ranks next to yeast in content of vitamins B and G.

Pellagra is a disease resulting from improper diet, and is fairly common in many parts of the South. In 1926, Dr. Joseph Goldberger, of the Public Health Service, demonstrated that this disease is due to the lack of a specific substance in the diet. This substance, which is of unknown chemical composition, is known as vitamin G, and is found in lean meat, fish, eggs, and milk.

No experiments have been conducted with farm animals to determine their need for vitamin G, but investigations by the Department of Agriculture and state experiment stations have shown that cottonseed meal in moderate quantities is an excellent feed for cattle.

ACTIVATED CARBON:

[PART 2] *A Modern Purifying Agent*

By CHARLES L. MANTELL
Consulting Engineer
New York City

THE VEGETABLE-OIL REFINERS were the first to appreciate the industrial applications of activated carbon on a large scale. In these industries, a well-developed and widely understood technology for the use of activated carbon has emerged. It may be well to treat this phase of the matter in considerable detail, as the same manner of using the carbon, as far as equipment and operation are concerned, applies to all the other industries in which activated carbons now find employment.

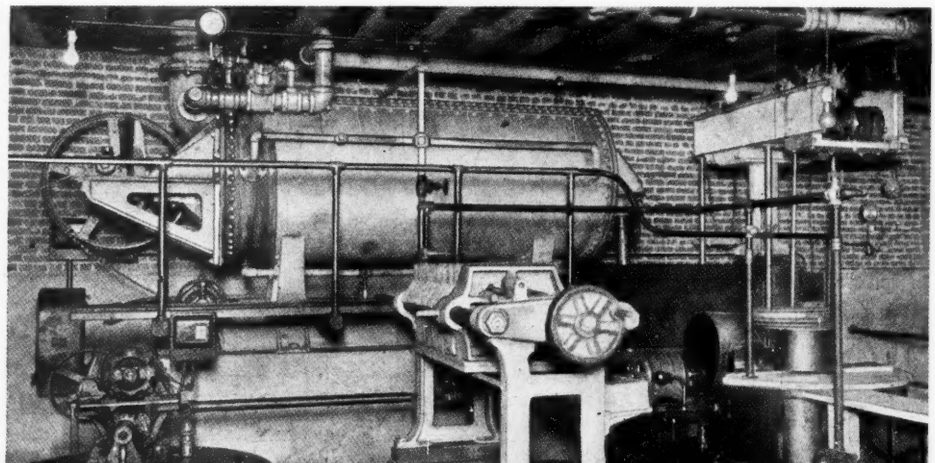
Fullers earth has long been the standard bleaching agent used in refining vegetable oils. This material is a clay which, to a limited extent, has adsorbtive properties similar to those possessed by activated carbons. Because it is comparatively cheap, large quantities may be used without making the bleaching cost inordinately high. The limited bleaching power per unit weight of fullers earth, however, entails a number of disadvantages which have caused vegetable-oil refiners to make radical changes in refining practice in recent years. Fullers earth is quite effective in removing excess yellow colors in vegetable oils, but is much less so in eliminating the red shades accompanying them. The activated carbons are particularly efficient in removing the red colors. Thus a combination of fullers earth and carbon, with each doing that part of the work for which it is best fitted, permits a marked reduction in the total quantity of bleaching solids used. Such a combination has become standard for such oils as cottonseed, peanut, and corn, for food purposes, soya-bean for industrial uses, and linseed for high-grade paint manufacture.

In the case of coconut, palm, and palm-kernel oils, removal of the red color is most important, for the yellow constituents are much less than in the oils previously mentioned. Industrial practice has shown that small percentages of activated carbon will do the work in a better manner than the high percentages of fullers earth formerly employed.

The same fine powders used in the decolorizing of aqueous liquids are satisfactory for oil work. Oil-decolorizing carbons ordinarily are slightly alkaline—that is, their water extract turns red litmus blue. Decidedly acid carbons are to be avoided, for they will increase the free fatty-acid content of the oil.

Unfavorable climatic conditions not infrequently are the cause of off-grade vegetable oils, representing lowered value. A very satisfactory adjustment to regular quality standards can be economically effected by treatment with activated carbon. The addition to crude cottonseed and other oils of a fraction of 1 per cent of activated carbon, along with an equal quantity of diatomaceous earth, adds to their market value by reducing color and refining losses. This treatment, of course, involves filtration and results in stabilizing quality, permitting storage over long periods without fermentation or decomposition.

Many of the largest lard refineries now use activated carbons with enough diatomaceous earth to assist filtra-



Rendering and refining unit for decolorizing lard with activated carbon, used by T. L. Lay Packing Company, Knoxville, Tenn.

tion. They have eliminated fullers earth completely, as in the decolorization of pure lard there is little, if any, subsequent opportunity for deodorization. The use of carbon in the refining of lard makes decolorization possible at very low temperatures, which adds to the efficiency of the removal of colloids by filtration and causes a minimum of adsorbed oxygen to be taken up by the lard.

Vegetable-oil refining usually entails the neutralization of free fatty acid by dilute solutions of caustic at different temperatures specific for each oil; removal of the soaps formed; bleaching; and, finally, deodorization of the oil. The small quantities of activated carbons used show little "gathering" or flocculating power for the suspended soaps formed in the refining. Small quantities of fullers earth, clays, or diatomaceous earths are often added to "gather" the soaps. Effective stirring is necessary. Bleaching is more efficient and rapid at temperatures obtainable by steam heating than at room temperatures.

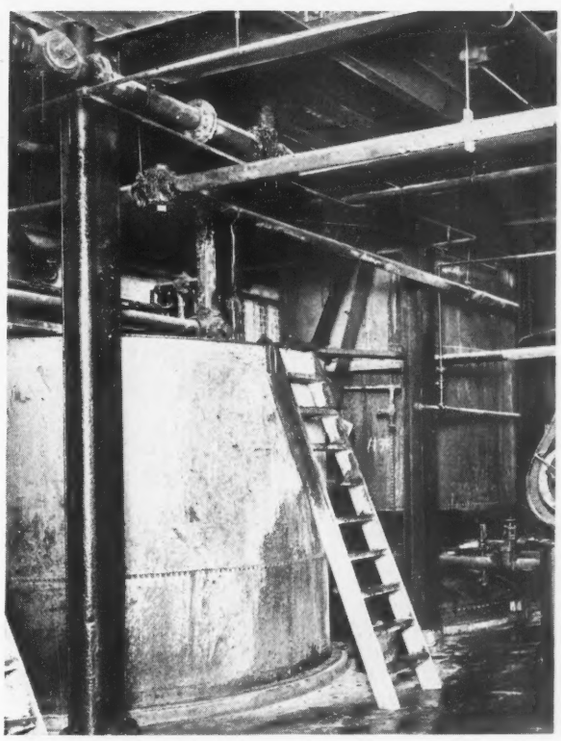
Due to their high adsorbing power, activated carbons effect a considerable deodorization of oils during bleaching. When used alone, fullers earth imparts a disagreeable earthy flavor, particularly objectionable in edible oils. The use of only small quantities of activated carbon with fullers earth will entirely remove this odor or flavor. In the case of bleached oils which are slightly rancid, the necessity for more drastic processing is often eliminated by treatment with activated carbons. With unbleached oils, both bleaching and removal of rancidity may be effected in one operation by the use of greater quantities of carbon than would be required for a prime oil. The deodorizing effect of carbon is indicated by the decreased consumption of steam in the deodorizing plant for effective removal of odors.

IT is often stated that there is a decreased oil-retention loss when activated carbons are substituted for fullers earth. Since smaller quantities of carbon are used for the same effect in color removal, with the resultant lower oil loss in the pressed cake, carbons vary widely in their oil-retention values, which are functions of their apparent densities.

The quantities of carbon employed may run as low as 0.05 per cent in the case of materials like lard; 0.125 per cent with coconut and palm-kernel oils, where the decolorizing carbon usually is employed alone; 1 to 3 per cent with cottonseed, peanut, soya-bean and corn oils, the bleach composition being approximately 1 part of carbon to 12 parts of earth; 2 to 5 per cent with linseed and rapeseed oils; and 1 to 3 per cent with tallows and greases, the bleach composition being 1 part of carbon to 12 parts of earth.

In most instances the temperature of treatment is 160 to 180 deg. F., except in the case of peanut and olive oils, where the temperature is 120 to 140 deg. There are wide variations in bleaching temperatures in individual plant practices. Some operators state that they obtain best results at 180 to 220 deg. A large number of plants expel moisture from the oil by heating before the bleaching mix is stirred in. The time of contact varies from 15 to 30 minutes.

Extended experimental work has shown a definite commercial adaptability of vegetable carbons to the decolorization and deodorization of fish oils, such as cod-liver, seal, whale, herring, and menhaden, which are exceedingly difficult to refine under ordinary conditions. In the case of high-grade cod-liver, seal, whale, or herring oils, particularly those which are being prepared for medicinal purposes—their vitamin contents—only low temperatures can be used during refining treatment. Activated carbons are well adapted for this use, as they are capable of decolorizing and deodorizing at low temperatures.



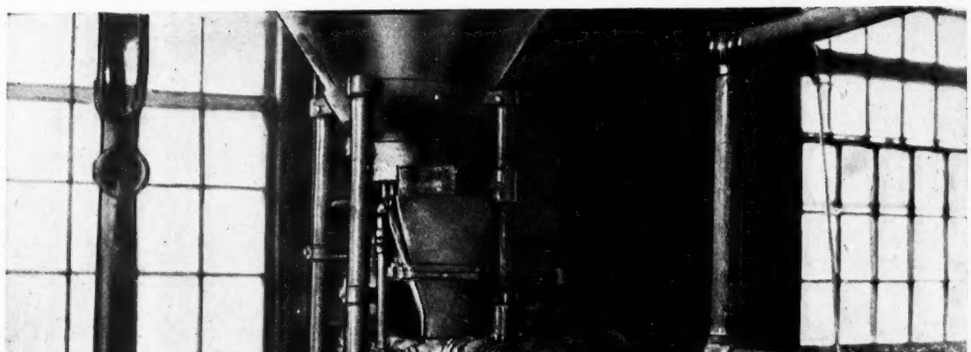
Agitator tank in which South Texas Cotton Oil Company mixes activated carbon with vegetable oils; storage tank showing in the background and filter press equipment at the right

Among other new developments in the use of activated carbon has been its application in the recovery of products formerly thrown away as of no further value. In preserving and canning, fruits are boiled with mixed sirups containing sucrose and glucose. These sirups gradually develop a dark color in continued use, and the general purity becomes so lowered that further utilization would impair the quality of the fruits treated with them. At this stage they were formerly discarded, despite their valuable sugar content. In present-day practice they are recovered by a simple treatment with decolorizing carbon, restored to their former appearance, and again rendered satisfactory for further use.

Improvement in odor, flavor, and appearance of products already of satisfactory and acceptable quality has often brought increased salability and higher prices. The introduction of activated carbon into gelatin manufacture has resulted in distinctly higher grade products at a cost which makes its production commercially desirable. The use of activated carbon in the purification of gelatin gives a brilliancy and luster to the product not readily obtainable by other simple means.

Activated carbons are rendering a valuable service in the treatment of such products as have become contaminated with impurities, enabling such materials to be brought back to a merchantable condition, thereby obviating considerable losses.

That removal of color and impurities by carbon is inexpensive is indicated by its commercial utilization in



Dry feed machine for applying activated carbon to water supply, mounted on platform scale to facilitate check weighings

the preparation of many widely used, cheap inorganic chemicals. It finds application in the manufacture of borax, Epsom salts (magnesium sulphate), glaubers salts (sodium sulphate), boric acid, lead chloride, and zinc salts. After decolorization and filtration, the clear liquors are crystallized.

Activated carbons are not limited in their application to color removal only. A zinc-sulphate manufacturer was faced with several complaints of odor in the finished product, although the material met all specifications as far as purity, color, and other tests were concerned. It developed that the odor was caused by a trace of hydrogen sulphide, which persisted even after recrystallization and thorough washing. Treatment of the zinc-sulphate liquor with a small quantity of carbon solved the problem, eliminating all further difficulty with regard to odor. Inasmuch as it was necessary for the liquor to be filtered for removal of suspended solids in the ordinary process, the carbon could be conveniently added, together with the filter aid, thereby eliminating any necessity of an extra step for deodorizing.

Chemical bleaching, formerly used in the preparation of phosphoric, tartaric, and citric acids, has become practically obsolete, especially when the resulting materials enter into food products. The use of activated carbon has enabled manufacturers of phosphoric acid to produce a water-white acid from either bone or rock, with a negligible extra cost. It has widened the field of available raw materials by making possible the utilization of cruder starting substances, since color in the finished product can be readily removed. Decolorizing carbons have become standard in the manufacture of tartaric and citric acids of the highest grade, as well as of their salts. A similar situation exists in respect to lactic acid, which comes on the market in various concentrations and of a color and purity which bear a strict relation to the selling value.

In the case of acetic acid in the form of white or cider vinegar, activated carbon is used to get rid of off-colors and undesirable flavors.

In the preparation of chemically pure, water-white glycerine, it was formerly necessary to start with a fairly good crude, treat it exhaustively, then repeatedly distill it to obtain a colorless product of a purity high enough to satisfy medicinal and manufacturing requirements. Now, with the employment of activated carbons for decolorizing, practically any grade of crude can be handled. Distillation for concentration of the product has not been eliminated, but the necessity for it as a means of purification has been very materially reduced.

Glycerine producers desire to impart a sparkle and luster to their product in addition to the removal of color. This may be accomplished by the use of the best grades of activated carbons, giving a perfectly colorless glycerine of sparkling brilliancy. Certain types of carbon possessing extraordinary adsorptive properties have also the peculiar faculty of allaying the inconvenient tendency of glycerine solutions to foam during processing or in the subsequent use of the finished product, as, for example, in automobile radiators as anti-freeze. The probable reason for this lies in the complete adsorption by the carbon of exceedingly fine or colloidally dispersed particles, the presence of which in the liquid presents focusing points for vapor evolution.

In contrast to those applications previously mentioned in which activated carbons are now employed in standard practice, there are developing in many other industries interesting uses for the remarkable adsorbing powers of these carbons. The ever-increasing demand for things that give satisfaction is not confined to one line of endeavor. Most industries of any size now have one or more employees engaged on research work, striving to improve the quality of their product. This is especially true of industries producing or handling things that we eat or drink. For example, the demand for palatable drinking water increases as we progress along other lines. It is now reaching the point where, it is believed, waterworks officials must begin to look for new methods of treatment that will produce more perfect water.

Industry after industry has been called upon to eliminate or render inoffensive waste products discharged into a watercourse used for a public supply. In some instances this is imposing a heavy burden upon the very industries that give employment to the inhabitants of the cities and villages whose water is being polluted. With the elimination or purification of much of the wastes from industries, the increasing population still causes so much pollution that present methods of treatment are taxed to their limit in some localities to produce a fair quality of water. The margin of safety against taste becomes narrower and narrower for some of our supplies now producing satisfactory water. The time is not far distant

when steps must be taken to obtain a less polluted supply, or there must be an improvement in purification methods.

Bone char, and some of the activated chars in their early stages, had been used to a limited extent in household or other small filters for a number of years. Recent investigations in connection with the Chicago water supply have shown that activated carbons may be of considerable value in the removal of odors or flavors from potable waters. In December, 1927, Chicago experienced in its water supply probably the greatest contamination due to phenols (carbolic acid) ever experienced by any large city in the country. Damages, largely to food products, were estimated to be fully one-half million dollars. Food cooked with the water in perhaps 200,000 homes tasted so strongly of chlorophenol that it could not be consumed. Rather extensive experiments have shown that activated carbons economically and effectively remove such undesirable tastes and odors. Work at Chicago shows that activated carbons furnish a means of protection against phenol and chlorophenol tastes. The last-mentioned is produced by the action of chlorine, used in treating the water to kill bacteria, on phenol or substances of phenolic character present in the water.

Many waters are polluted with such a variety of compounds that it may be more advantageous to over-chlorinate them in order to break down such compounds as may be attacked by chlorine, and then to use activated carbon for the removal of the excess chlorine and certain compounds not attacked by chlorine, with the resultant production of a potable water of excellent taste. Applications of activated carbon at Cleveland have been made in this way for dechlorinating water. Carbon of a much less active form than those on the market today, has been used for this purpose by the Candy Filter Company in England for nearly nineteen years.

The addition of an excess of chlorine to water results in the conversion of some of the taste-producing compounds to others which have little or no taste. Chemical methods for the removal of excess chlorine, such as the addition of sulphur dioxide, probably do nothing more than take out the excess of chlorine, converting it to hydrochloric acid. Another method employing potassium permanganate results in the oxidation of organic compounds. All such treatments remove little or nothing from the water but convert part of the offensive into inoffensive compounds. Activated carbons, on the other hand, actually take out these undesirable constituents from the water. In this respect they yield results which are more satisfactory than those obtained by chemical treatments. This has been satisfactorily confirmed in experimental plants.

The use of only small quantities of activated carbon will remove the last vestiges of color from treated effluents. This application marks a distinct advance in the treatment of industrial wastes, in that the combination of chemical coagulation and activated carbon decolorization produces a pure water of the highest quality. The same thing applies to spent dye liquors. Large-scale experiments are now under way employing carbon for taking out the last traces of spent dye subsequent to the grosser preliminary process of treatment by chemicals.

In recent years the use of charcoal in medicine and pharmacy has grown rapidly. The adsorbent action of the carbons for pathogenic bacteria, poisons, alkaloids, enzymes, and toxins of various sorts has been widely studied and their successful application in medicine established. As a result, small tonnages of the activated carbons are finding application in the manufacture of digestive tablets, pills, and the like.

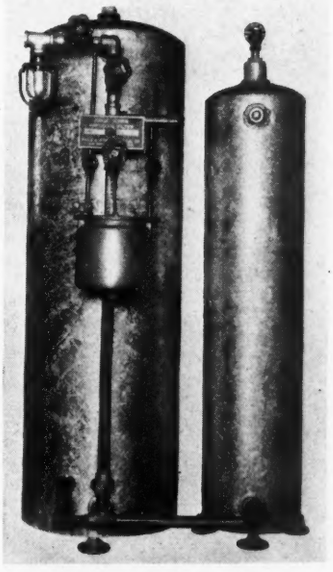
In the use of charcoal in cases of infection, it is perhaps of greatest importance to realize that activated carbons not only adsorb toxins and bacteria but also counteract the acidity of intestinal contents arising through bacterial influence. It is known that the more voluminous a carbon, the greater is its power of adsorbing toxins and bacteria. The use of wood charcoal in cattle feed is common. The commercial activated carbons are many times more effective; therefore, much smaller quantities can be used in replacing wood charcoal. Furthermore, as some of the activated carbons are very voluminous, their replacement of wood charcoal in cattle feed represents a financial saving.

Cheap substitutes for blood charcoal, which is required in fighting cholera and dysentery, now exist in the form of the commercial activated carbons. These materials can be of great value in the prevention of hog cholera, the nightmare of the raiser of hogs.

When water contaminated with micro-organisms is shaken with activated carbon and filtered through paper, the clear filtrate generally is bacteria-free, as the micro-organisms have been taken up by the carbon. The carbons do not lose their activity when administered internally. The possibilities of utilizing the adsorbent powers of activated carbon in medicine are just beginning to be realized. When further work is done, the application will be widely varied.

There doubtless are scores of applications for decolorizing carbons in the process industries today, but the comparatively recent and rapid development of these products has prevented a widespread knowledge of their properties and advantages. Any manufacturing operation employing crystallization, distillation, or chemical processing for the elimination of color or other impurities represents a possible application. Unfortunately, there still exist the remains of the old tendency to regard many applications of adsorption with carbons as secret processes, to be carefully guarded from disclosure, rather than shared freely with other industries.

Pressure filter and deodorizer supplied by Paige & Jones Chemical Company for using activated carbon in purifying water supplies



CHEMICAL TREATMENT

By the Milling Industry

By D. W. KENT-JONES
Dover, England

FOR MANY YEARS NOW the milling industry, practically the whole world over, has availed itself of the discoveries of milling engineers and cereal chemists for the improvement of the color and the baking value of flour. It should not be forgotten that in the days when wheat-cleaning machinery was much more imperfect than it is today, the color of the flour naturally suffered because of the impossibility of removing all the dirt from the crease of the wheat berry. Now that this can be done more effectively, the color of flour has improved and it seems a little illogical that progress should be stopped at this point and advantage should not be taken of the discoveries made with respect to artificial bleaching.

If there had been any evidence whatever that artificial bleaching had any detrimental effect on the health of the consumer, this would be another matter, just the same as if it had been found that the removal of all the dirt in the cleaning of wheat berries was harmful in this respect. Furthermore, it should be borne in mind that wheat is grown over a large part of the world in varying climates and in vastly different soils. It is natural, therefore, that it should vary in such matters as moisture content, hardness, and the baking quality of its flour. As it has been discovered that the natural deficiencies in many of these respects can be remedied satisfactorily by the use of harmless chemicals, it is not surprising that the practice is so widespread. There are still a few countries where the treatment of flour with chemical substances is forbidden officially, but even in a number of these, no active official action has been taken against the users. There is no doubt that the practice tends to increase rather than decrease, although whether the recently discovered methods of assisting the natural strength of flour by the physical processes of heating will become more popular it is not possible to say.

There have been many official inquiries into the treatment of flour with chemical substances. After comprehensive investigation, a departmental committee of the British Ministry of Health recommended in February, 1927, that flour be guarded against unnecessary treatment with foreign substances, adding that on the basis of present knowledge the committee was not prepared to counsel the complete elimination of present-day bleaching agents and improvers. In point of fact, the use of ammonium persulphate was considered harmless, although it was recommended that flour, if possible, should be improved by physical processes rather than by chemical means. The physical processes referred to were those based on the heating of flour, which have been associated mainly with my work, and which are attracting considerable attention in Europe at present, being accorded the compliment of imitation by others. So far, no official action has followed the promulgation of this report.

It should be borne clearly in mind that bleaching and flour improving—that is, the improving of the baking quality—are two distinct things, although there are substances capable of performing both simultaneously. Flour bleaching is concerned with the removal of the yellow color attributable to its carotin content. Some flours have naturally a higher carotin than others and, as there is a demand for white bread, the miller seeks a means for remedying this defect.

Oxidation of carotin destroys the yellow color and one of the earliest and most successful bleachers was nitrogen peroxide, which is still extensively used both in America and, particularly, in Europe. Probably few bleaching agents have been investigated so thoroughly as nitrogen peroxide and few so strongly attacked by those who are opposed to any sort of flour treatment, however beneficial the result. Nitrogen peroxide is a bleacher merely, having no effect whatever on the baking quality of the flour. Also, it should be remembered that dull and poorly colored flour is not caused entirely by carotin. Low-grade flours are dull because of the presence of finely divided offal, scraped or broken off from the bran and outer coverings of the grain in the process of milling. Ordinary bleaching agents do not whiten this material, the coloring matter of which is said to be either xanthophyll or a flavone. It is, therefore, incorrect to state that bleaching permits dirty, dull, and low-grade flour to be passed off as the high-grade and well-milled material. Bleaching removes the yellow tint, and public taste prefers white bread to yellowish bread. As a matter of fact, in demonstrating the value of bleaching I always prefer to do so on patent flour.

The attack on the use of nitrogen peroxide has centered mainly around the minute quantity of nitrite left in flour. As the greatest amount of residual nitrite found in bread made from bleached flour is about 0.025 part per million, it can be seen that this criticism is of little value. Further, it should be remembered that rain

water contains 70 times, and ham as much as 500 times this amount. To consume a medicinal dose of nitrite no less than 10,000 1-lb. loaves would have to be eaten, calling for consistent bread eating for a period of more than 50 years. There is no doubt that the nitrogen peroxide methods of bleaching have proved effective and have come to stay, although they probably are yielding ground to more modern methods.

Another popular method of bleaching is that by the aid of benzoyl peroxide. The commercial product containing this active substance is known as "Novadel" or "Novadelox." The efficacy of bleaching with "Novadelox" has been established beyond all doubt. Although "Novadelox" contains only a proportion of benzoyl peroxide (probably about 25 per cent), it is an effective bleaching agent when mixed with flour at the rate of 1 part in 15,000. The bleaching effect takes a little time, at least 24 hours being required under ordinary circumstances although even longer times give better results. There is no doubt of the popularity of this modern bleaching method. It should be remembered that benzoyl peroxide is purely and simply a bleaching agent and has no effect whatever on the baking quality or fermentation behavior of the flour. It is used extensively and is well appreciated both in America and in Europe.

In America, what may be termed "powder improvers" do not seem to have acquired the popularity they have in Europe. It is a little difficult to give a feasible explanation of this, considering that persulphate is but little used in America, while it remains by far the most popular improver in Europe. The improving action of persulphate on flour was discovered partly by Mr. Jago, the eminent cereal chemist, whose works are well known and remain popular in America.

IT would be difficult to give the exact proportion of European flour intended for breadmaking purposes which is treated in some way or other with persulphate but it is certainly very high. Persulphate has a particularly pleasing action on the dough, giving it increased strength and stability, while at the same time imparting a certain liveliness. Possibly the difference between American and European bread accounts for the American lack of appreciation of this improver, as in American bread a number of enriching ingredients are added and the value of persulphate may not be so obvious. In Europe, where the bread is made almost entirely from flour, water, salt, and yeast, most millers prefer ammonium persulphate to other forms of treatment. In America bromate appears to be more popular than persulphate and is appreciated by bakers as well as millers. Acid phosphates have been used in the past but have been superseded by more modern and efficient methods. Bromate in the form of Arkady is also popular among European bakers.

Of the substances that both bleach and improve, "Beta Chlor" and "Agene" stand pre-eminent. The former is essentially chlorine to which has been added a small proportion of nitrosyl chloride. It is an effective bleaching agent and it is possible that its actual action in this respect is the formation of a carotin dichloride which is a colorless body. The quantity of "Beta Chlor" used varies with the yellowness of the flour and other circumstances, but about 1 part in 5,000 seems to be an average figure. Its improving action on the baking quality of flour is startling, particularly with the lower grades, with which larger quantities are often used. The equipment for the use of this material is well designed and capable of good control and regulation. These are important factors when improvers or bleachers of any sort are to be used. It is asserted that chlorine "matures" the flour—that is, gives it at once those characteristics which are desired by bakers and which normally are found only after several weeks' storage.

Of recent years a serious rival to this process has been introduced, the active principle of which is said to be nitrogen tri-chloride. It is sold under the name of "Agene." Undoubtedly, this is an extremely effective and powerful substance, approximately eight times as potent as "Beta Chlor." This, of course, has its advantages and, to some extent, disadvantages, as naturally so very powerful a reagent must be controlled with extreme care. Both these processes are popular in Europe as well as in America.

It should be remembered, however, that a substance which acts both as a bleacher and an improver has its disadvantages, as naturally there may be times when one wishes to bleach the flour strongly, and then it is absolutely necessary to strengthen the baking quality very much at the same time. Alternatively, one may require only a slight improvement in baking quality, and in that case only a slight bleaching can be given. It is not possible to bleach slightly and improve strongly, or vice versa. There is a great deal to be said for the handling of these two factors independently. Recently, there has been an amalgamation of the "Agene" and Novadelox" interests and, although I have no information on the subject, it appears probable that considerations of this sort may have been responsible partly for the action taken.

The popularity of these gas treatments, which are bleachers as well as improvers, has been responsible for loosely terming all treatment processes "bleaching." When I was in America two years ago I was informed repeatedly that such and such a loaf, in experimental work, had been over-bleached when, of course, what was really meant was that too much of the material had been used, and the improving action had been too strong and harsh, with consequent damage to the gluten. A clear conception between bleaching and improving certainly is desirable.

IT is difficult to give any authoritative opinion as to the relative virtues of these treatments. Naturally, much depends upon conditions and personal bias. After many years of experience with flours from all over the world, I am strongly of the opinion that it is best, whenever possible, to handle the improving factor apart from the bleaching factor, and hence have a decided preference for using independent treatments. For this reason, improvement should be carried out by the addition of persulphate or bromate, and certainly for European flours, if not for flours generally, I would give preference to the former.

With regard to bleachers that are bleaching agents only, there are only nitrogen peroxide and benzoyl peroxide to be considered. In this respect the wonderful headway of Novadel (the proprietary name by which benzoyl peroxide is sold) speaks for itself. The independent treatment of flour with persulphate and benzoyl peroxide gives astonishingly good results.

There is no doubt that the careful use of these various substances has been of immense value to millers, bakers, and the general public. It has led to the production of better bread from wheats that certainly must be used some way or other. If improvers were not permitted there seems but little doubt that bread prices would rise.

Changing Habits in

FOOD CONSUMPTION

By E. G. MONTGOMERY
Chief, Foodstuffs Division,
U. S. Department of Commerce

CHANGING HABITS in the consumption of food are of interest to almost everyone. To producers and manufacturers they give a key to long-time policies in the development of the industry. Dietitians think of the changes in terms of public health and welfare. Economists are interested to determine how the national income is spent.

The consumer is chiefly the person who determines the trends. But just why there is a steady shift from one type of foodstuff to another is sometimes difficult to explain. This subject offers a wide field for investigation. During the past 30 years some striking changes have been made in our food-consumption habits. Figures are not very accurate, even on the principal food products, especially for a generation ago. It is believed, however, that the figures are sufficiently complete to give a very good general idea of the changes that have taken place for some of the main groups. The following table gives a summary of some recent figures compiled by the U. S. Department of Commerce:

Changes in Per Capita Food Consumption

	About 1899 Pounds per Capita	1922–27 Pounds per Capita	Change + = Increase — = Decrease
Cereals	350	230	—120
Meats	142	145	+ 3
Fats and oils	34	44	+ 10
Dairy products (in terms of milk)	800–900	1,040 (1926)	+150
Principal fruits (in terms of fresh fruit)	169	192	+ 23
Fresh vegetables	Not sufficient data		.....
Total	1,606	1,756	+150

This tabulation indicates an apparent increase of nearly 10 per cent in the total pounds consumed per capita of the six major food groups listed. However, this does not mean that people now eat more than formerly. It indicates merely changing food habits. It should especially be noticed that some of the commodities in which there has been a decided increase, particularly milk, are of a bulky type, including much water. Since data are so meager, no estimate is attempted of the food consumption expressed in terms of calories.

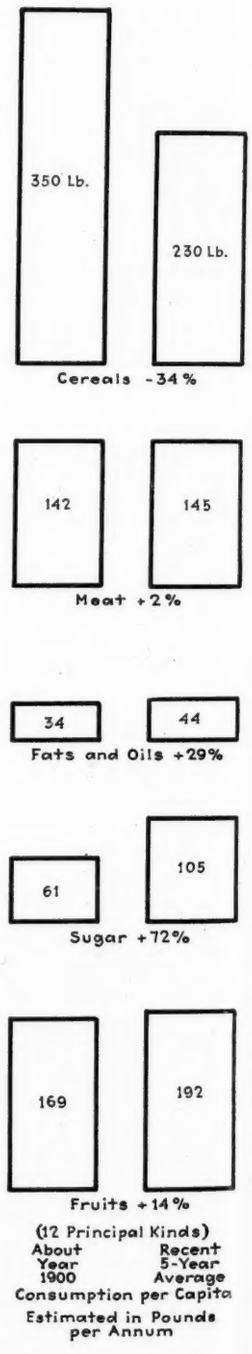
The group marked "cereals," of course, is composed principally of flour and meal. Apparently, we are at present consuming only about two-thirds as much in the form of cereal products as we did 30 years ago. There has been a notable decline in the consumption of wheat flour, buckwheat and rye flour, but the most striking decline has been made in the consumption of corn meal.

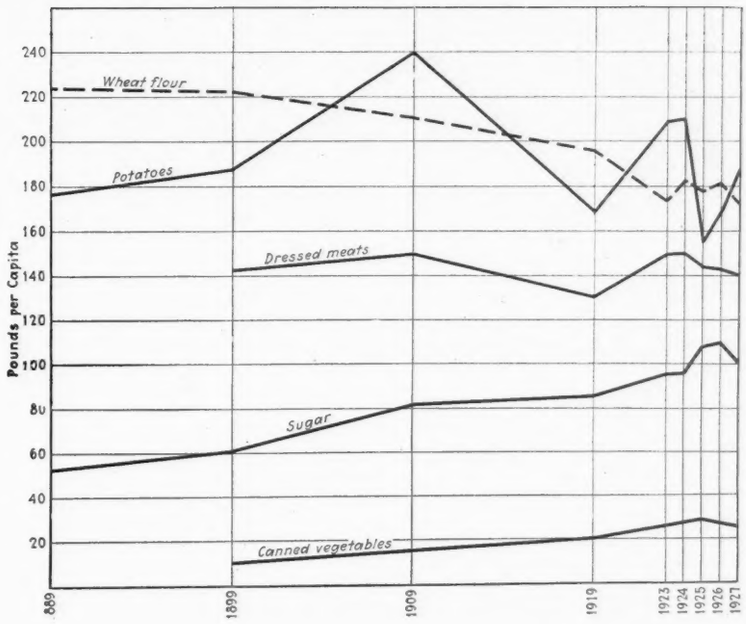
Meat consumption appears to be about the same now as it was 30 years ago. During this period, however, meats have fluctuated a great deal, from as high as 150 lb. per capita in 1908 to as low as 120 lb. per capita in 1917, and then up again in 1924 to about the 1908 level. Consumption of meats has been affected a great deal by the price per pound, and the distribution between different kinds of meat has varied also, apparently largely for the same reason.

The fats and oils group was made up 30 years ago chiefly of butter and lard. Since that time we have added about 10 lb. of vegetable oils to the diet, principally cottonseed and coconut oils, and consumed in the form of lard substitutes and margarin. From these facts it appears that the actual annual consumption of lard and butter combined has not changed much per capita in 30 years.

Sugar has shown the most remarkable increase of all the standard food products. This is no doubt in part due to the rapid increase of manufactured foods which use sugar, such as canned fruits and commercial bakery goods. Sugar, along with flour, constitutes a very cheap food product, and it appears that we have made up a substantial part of the decrease of flour consumption by the increased use of sugar. Thus the total carbohydrate consumption in starchy cereals, sugar, combined with sugar content of dairy products and fresh fruits, may well have remained substantially constant per capita through these three decades.

Dairy products are growing in importance. Even though the consumption was relatively





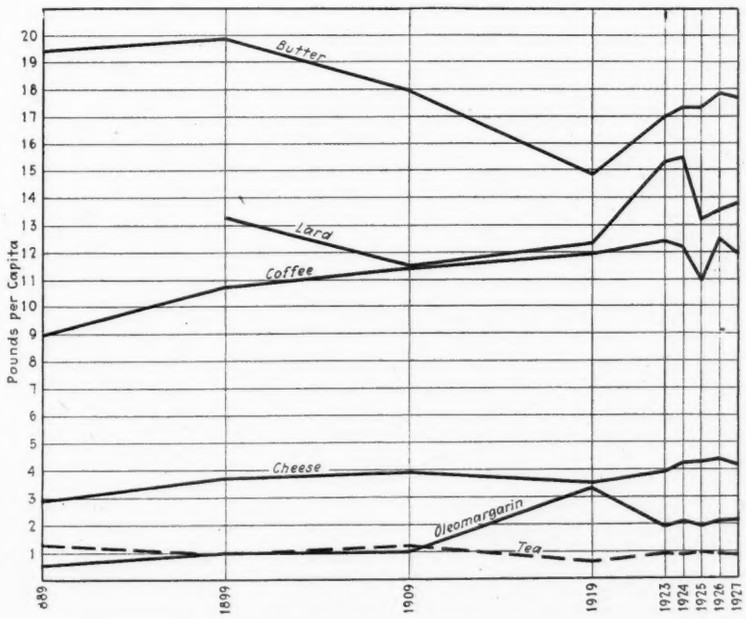
Graphic representation of pounds per capita of certain staple foods annually consumed by Americans

high 30 years ago, it seems to have increased by about 150 to 200 lb. in recent years, when all dairy products are expressed in terms of milk. Dairy products, of course, are consumed not only in the form of liquid milk but as butter, cheese, and condensed milk, and many manufactured products, such as ice cream and baked goods. The milk equivalent of all these manufactured products is included in the table.

Fruits have been increasing in use. Figures are not available for many of the minor fruits, but are reasonably complete for the twelve principal fruits. From these figures we arrive at a rough estimate that 30 years ago the consumption, when expressed in terms of fresh fruits, was about 169 lb. In recent years the consumption has been about 192 lb. Of course, if we could add the minor fruits and berries it would give a somewhat higher figure for both years. A large proportion of these fruits is canned or dried and not consumed in the fresh form; the total of all such products is included in the table on the equivalent fresh-fruit basis.

No attempt has been made to figure out just how much food is consumed in terms of calories for the two periods, as data are too incomplete to form any estimate as to what would be an average ration either 30 years ago or at present. However, the figures do indicate that the principal change that has taken place has been a decline in the consumption of flour and bread and an increase in the consumption of oils, sugar, dairy products, and fruits, which may about offset the decline in cereals. In other words, whether or not we have changed in the total calorie consumption of foods, it is clear that we have changed greatly in the kinds of foods consumed.

This is of great interest to the manufacturing and distributing food trade. We are constantly inventing new ways of serving old foods, such as converting wheat or corn grits into breakfast foods, or converting large quantities of fruits into canned or preserved products combined with sugar. It is these constant changes that are going on that offer new opportunities to business and industry for developing new food products out of old materials, putting them up in new packages and new forms, and inventing new machinery and new factories to produce the goods. Even the distributive agencies for food products have been profoundly affected in the past 30 years, not only by the kinds of foods sold but the way in which they have been put up to to meet the convenience or taste of the consumer.



Graphs illustrating consumption of certain fats and beverages

[*Editorial Note: A further analysis will be made in subsequent issues of* FOOD INDUSTRIES *of each of the major food groups, presenting statistically the trends and interpreting, so far as possible, their causes and their significance. The groups so discussed will include cereals, milk products, animal products, fruits, vegetables, fish, sugar and confectionary, and miscellaneous materials, including beverages, flavors, condiments, and the like.*]

Abstracts of Current Literature

BACTERIOLOGICAL BASIS FOR THE EFFECTIVE PASTEURIZATION OF ICE CREAM. J. H. Shrader and others. *American Journal of Public Health*, Vol. 20, p. 492; May, 1930.

The committee on dairy products and eggs of the American Public Health Association reports findings upon the effective pasteurization of ice cream. A survey of methods used by 500 ice-cream companies revealed the use of temperatures and holding periods ranging from 140 deg. F. for 30 minutes, to 165 deg. F. for 30 minutes and up to 185 deg. F. for 10 minutes, with all sorts of intermediate combinations of temperatures and times. *B. coli* destruction is not always a reliable measure of the effectiveness of milk pasteurization, nor is it any more useful in determining the proper pasteurization procedure for ice-cream mixes. Experiments on a commercial ice-cream mix inoculated with pathogenic organisms demonstrate that the time and temperature of 30 minutes at 143.5 deg. F. recommended by the committee for the pasteurization of milk allows an ample margin of safety for the pasteurization of cream and of commercial ice-cream mix.

* * *

THE NUMBER AND TYPE OF BACTERIA IN COMMERCIALLY PREPARED INFANT FOODS. G. J. Hucker and Alice M. Hucker. Technical Bulletin No. 153, New York Agricultural Experiment Station, Geneva, N. Y. 28 pp.

A study of the bacterial content of a number ot the leading brands of infant foods. Organisms ranged in number from 10 to 600,000 per gram, with 20,000 as the average. Suggestions for sanitary standards for such foods are given, including a tentative limit of 10,000 per gram.

* * *

COLD STORAGE PROBLEMS. Circular No. 597 of the Northwest Fruit Barrelers' Association, 909 Board of Trade Building, Portland, Ore.

This bulletin contains verbatim the talk of Robert Ireland, Terminal Ice & Cold Storage Company, Portland, Ore., at the annual meeting of the Northwest Fruit Barrelers' Association. In the course of his talk, Mr. Ireland outlined a method of cold processing fruit in a barrel at a temperature from 8 to 10 deg. F. Special reference is made to strawberries because their composition makes them difficult to process satisfactorily.

SPOILED TOMATO PRODUCTS. Carl S. Pederson. *Zentralblatt für Bakteriologie*, Vol. 80, pp. 42-57 and 218-24; Jan. 22 and Feb. 20, 1930.

As part of a program of investigation of the causes and prevention of spoilage in canned tomato products, numerous jars, cans, and bottles of tomatoes, pulp, catsup, and the like were studied after spoilage. A few yeasts and spore-forming organisms were observed but not identified. Aside from these, six species of organisms were identified and examined, namely *Leuconostoc pleofructi* and five varieties of Lactobacillus. These were *L. lycopersici, L. pentoaceticus, L. mannitopoeus, L. gayoni* and *L. plantarum.* The observations which were made included determinations of thermal death point, optimum temperature range of growth, and hydrogen ion concentration attained. All six organisms are sufficiently heat sensitive so that ordinary canning procedure should suffice to destroy them. To give further data for identification and differentiation of the tomato spoilage organisms, a comparative study was made of their fermentation behavior with respect to glucose, fructose, and arabinose. From glucose the products are lactic and acetic acids, alcohol, and carbon dioxide, in about the same proportions from all except *L. plantarum*, which forms hardly anything but lactic acid. Fructose gives the same products, excepting that mannitol appears before ethyl alcohol, yielding alcohol if allowed to ferment. From arabinose the main products are lactic and acetic acids.

* * *

CANDY DISTRIBUTION IN THE UNITED STATES. Rupert L. Purdon, Chief of Confectionery Section Foodstuffs Division. U. S. Department of Commerce, Domestic Commerce Series No. 31. December, 1929, 34 pp. Superintendent of Documents. 10 cents.

This is a continuation of an earlier report (Domestic Commerce Series, No. 23, published in 1928), dealing chiefly with distribution. The present work embodies a study for the period 1925-28 of per capita consumption, price trends, sales distribution, and rate of turnover of investment in stocks of raw material, finished goods, and containers. Those making perishable and semi-perishable products, together with any who are uncertain regarding their cost accountancy, will find it especially timely.

WASHING FRUIT TO REMOVE SPRAY RESIDUE IN THE HUDSON VALLEY, E. V. Shear, New York State Agricultural Experiment Station, Geneva, N. Y. Bulletin No. 575, October, 1929, 34 pp.

Although sample analyses show New York fruit to have a spray residue contamination well below the tolerance of 0.01 grain of As_2O_3 per pound of fruit, the author believes fruit washing to be well worth the trouble and expense involved. The appearance of the fruit is greatly improved, and any spray residues that may remain are definitely reduced to an unquestionably safe concentration. If properly processed, fruit is not damaged for storage purposes. Hydrochloric-acid solutions from 1 per cent to 0.05 per cent actual acid concentrations were found to be worthy of recommendation. Methods of washing and alkaline types of washing solutions are discussed. A bibliography is included.

* * *

A TREATISE ON MAYONNAISE. Edited by D. M. Gray, *et al.* Mayonnaise Products Manufacturers' Association of America, Inc., 1500 Walnut St., Philadelphia, Pa., 22 pp.

In this booklet is detailed the manufacture of mayonnaise, no mention being made of other salad dressings of the mayonnaise type. Additional matter defines mayonnaise and discusses each constituent as to source, composition, purity specifications, nutritional value, and function in mayonnaise manufacture. This booklet contains a fund of information much in demand at present. An interesting feature, occupying the third cover, is a list of present members of the Mayonnaise Association, together with their addresses and brands.

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THE TREATMENT OF DAIRY WASTES. By E. W. Steel and P. J. A. Zeller. Bulletin 38, Texas Engineering Experiment Station, College Station, Texas. Series 4, Vol. 1, No. 5. May 1, 1930, 16 pp.

The relative merits of a trickling filter is compared with the chemical treatment of dairy wastes. Contains short bibliography and a list of bulletins issued by the Texas Engineering Experiment Station.

* * *

THE CONTROL OF BACTERIA THAT GROW DURING PASTEURIZATION. Maurice W. Yale, Technical Bulletin No. 156, The New York Agricultural Experiment Station, Geneva, N. Y. 25 pp.

Report of a study of commercial dairies at Buffalo, showing that factors favoring development of thermophilic bacteria in milk are: (1) presence of thermophiles in the raw supply; (2) holding of hot milk in equipment for periods longer than 30 minutes because of stops in the pasteurizing run; (3) repasteurization of returns; (4) cooking of milk solids on the walls of the heater; (5) presence of dead ends; (6) development within the holder.

DRYING CUT FRUITS. P. F. Nichols and A. W. Christie. University of California College of Agriculture, Agricultural Experiment Station, Berkeley, Calif. Bulletin 485, February, 1930, 46 pp.

This pamphlet is devoted to the technology of cut-fruit drying, special attention being paid to reasons for and effect of sulphuring. There are 16 pages well illustrated by photographs; diagrams and graphic curves deal with the process, equipment, and effects of sulphur treatment. Drying of apples, apricots, peaches, and pears, and storage of cut fruit are discussed fully. Includes several tables of data and a bibliography. Station publications available for free distribution are listed on the back cover page. This bulletin supersedes that part of Bulletins 333 and 337 of this experiment station which pertain to dehydration of cut fruits and those parts of Bulletin 388 that deal with sulphuring of cut fruits for drying. It supplements, without contradictions, the chapters on drying of fruits in "Commercial Fruit and Vegetable Products," by W. V. Cruess.

* * *

THE ANTI-RACHITIC VALUE OF IRRADIATED WHEAT. F. F. Tisdall and A. Brown. *Journal of American Medical Association,* Vol. 94, p. 854; March 22, 1930.

Animal feeding tests show that commercially irradiated whole wheat cereal, in the form of irradiated muffets, is anti-rachitically active. The anti-rachitic potency of muffets is such that they should not be regarded as a concentrated source of vitamin D, such as irradiated ergosterol. Both whole wheat and wheat germ can be rendered anti-rachitic by irradiation with rays from the mercury quartz lamp.

* * *

COMMITTEE ON FOODS. Editorial and List. *Journal of the American Medical Association,* Vol. 94, pp. 411 and 415; Feb. 8, 1930.

There has been established a committee on foods by the council on pharmacy and chemistry of the American Medical Association. The committee considers various food products themselves as well as advertising claims for such foods, and to those which are approved it grants the permission to use the seal of the committee on packages and in advertising. The first published list includes "Junket," "Spintrate," a grapefruit juice, an orange butter, macaroni, and several cereal products.

* * *

PECTIN IN GRAPES. G. Marsh and G. A. Pitman. *Fruit Products Journal,* Vol. 9, pp. 187-8; February, 1930.

To answer the question as to whether surplus grapes could be profitably utilized in pectin manufacture, grapes were picked at various times during the growing season and kept in freezing storage until the following April. A slight increase was observed in the ratio of weight of berries to weight of stems as growing progressed. For pectin tests, the hand-crushed samples were heated to inactivate the pectin-destroying enzyme, and the juice was extracted by hand pressing through cheesecloth. Pectin determinations were made by the Wichman method, in which the pectin is precipitated, hydrolyzed, and weighed as pectic acid. Results with Tokay, Zinfandel, and Alicante grapes showed a progressive decrease in pectin content as maturity increased. Moreover, the pectin content was low even in samples taken at an early stage of maturity. For instance, with Tokay grapes the earliest samples would have yielded 2.32 lb. of pectin per 100 gal. of juice; the latest (ripest) samples would have yielded only 1.18 lb. per 100 gal. The highest yields from Zinfandel and Alicante grapes would be less than the lowest yields reported for Tokay grapes. In view of the large available tonnage of citrus and apple culls, giving considerably higher yields of pectin, grapes cannot be considered a potential profitable source of pectin, even though the yield probably would be somewhat higher from whole grapes than from the juice.

* * *

PASTEURIZED DRIED FRUITS. C. R. Fellers. *American Journal of Public Health,* Vol. 20, p. 175; February, 1930.

Laboratory tests show the highest bacteria count on raw dates; for sulphured fruits the count is lowest. The length of storage chiefly determines the number of organisms present. Bulk-dried fruits harbored more microorganisms than those that were packaged. Temperatures of 160 deg. to 185 deg. F. in the fruit at humidities of 70 to 100, held for from 30 to 90 minutes were found to be effective for the pasteurization of different dried fruits. A usual "coming-up" time of 10 to 30 minutes is necessary in addition. Acid fruits are more easily pasteurized than those of a higher pH. From a public health viewpoint, pasteurization marks a definite advance in the merchandising of dried fruits.

* * *

OVEN FUELS. F. P. Siebel, Jr. *Bakers' Weekly,* Vol. 66, No. 5, pp. 59-60; May 3, 1930.

Comparison of the performance and cost of different fuels in bakery ovens is complicated by the variety of forms of the fuels and of units in which they are sold (tons, gallons, cubic feet, kilowatt-hours). There is also considerable variation in the kind and construction of ovens. Overhead charges differ much with the amount of handling required, ranging from 21.5 per cent for solid fuels down to 4 per cent for electricity in one comparison. To facilitate study of performance characteristics and operating costs, tabular comparisons are made of the heat values, oven efficiencies, unit costs, amounts required to bake 100 lb. of bread, and overhead charges of fuels suitable for bakeries. These include coal (bituminous, semi-anthracite, anthracite), coke, fuel oil, manufactured and natural gas, and electricity. As the cheapest fuels are low in efficiency and high in handling costs, there is less variation in over-all fuel costs than would appear from price alone. Local conditions usually are the determining factor.

* * *

HARDENING OILS. H. Mielck. *Seifensieder-Zeitung,* Vol. 57, pp. 241-3; April 3, 1930.

Two principal obstacles account for the slowing down of the extremely active, early development of commercial hydrogenation of oils. One is the growing necessity for continuous rather than batch operation, to meet the increasing demands for large-scale production at low cost. The other is the problem of odor in hardened fats. Continuous operation was impossible, regardless of improvements in oil-handling equipment, so long as particles of catalyst were allowed to become suspended in the oil and had to be separated by centrifuging or like treatment. Numerous proposals have therefore been made for providing a fixed catalyst and yet causing it to present a large surface area to the oil. Probably the ultimate development along this line will be of the type in which the catalyst is precipitated in silica gel or in fine siliceous fibers from which the oil does not carry away catalyst particles.

* * *

FERMENTING MOLASSES. Wm. L. Owen and V. C. Calma. *Zentralblatt für Bakteriologie,* Vol. 80, pp. 227-41; Feb. 20, 1930.

On account of the prevailing use of copper evaporator pans and other copper equipment in sugar refining, presence of this metal in molasses is quite common. Unfortunately, copper is so active an inhibitor of the alcoholic fermentation of a molasses mash that some expedient is needed to overcome its harmful effect. A quantitative investigation indicates that the lowest copper concentration which is harmful enough to stop fermentation is about 5 mg. in 200 c.c., or about 25 mg. per liter of molasses solution. From reasoning based on an earlier observation of Owen, to the effect that small additions of vegetable carbon accelerate alcoholic fermentation, trials were made to ascertain whether or not vegetable carbon could be made to counteract the toxicity of copper toward yeasts. It was found that the amount of vegetable carbon needed to counteract the toxic effect of 1 mg. of copper is at least 15 to 17 mg., and that the carbon must be added to the mash at the very beginning, because the poisoning by copper begins very quickly. Filtration of a treated mash effectively removes both the carbon and the copper.

Critical Book Reviews

CAMPBELL'S BOOK, A Text-Book on Canning, Preserving, and Pickling. By Clyde H. Campbell. Published by *Canning Age,* New York. 231 pp. Price, $7.50.

IT IS difficult to visualize a more ambitious undertaking than an attempt to write a book on the three subjects of canning, preserving, and pickling. Years ago this reviewer began a book on a single phase of one of these subjects and then abandoned it, appalled by the tremendous volume of work it entailed and the equally immense voids in his own knowledge. One is pardonably astonished, therefore, that anyone has essayed so formidable a task, even though assisted by C. P. Lathrop, who contributed an introductory chapter on preserves, jams, and jellies, and by Milo R. Daughters, who wrote the sections on pea and corn canning.

"Campbell's Book" is a chemist's book and will be of greatest use when in the hands of a technically trained man, whether he be employed in the laboratory or plant. Yet it contains chapters that appear to have been written by a production man. Such a chapter is the one on vinegar, which bears the internal evidence of authorship by one who has had much experience in its actual production. The chapters on pickles, and jellies and preserves are almost as well done.

The book itself contains much that is good and a small amount of unreliable information. At its close is given a bibliography that is not complete, is not well arranged, and does not cite references correctly. It is a chemist's bibliography, omitting engineering and agricultural references that are as much a part of the literature of food preservation as are the scientific references. Nevertheless, it is an excellent start. When the second edition is issued the references to all books and bulletins should also show the year of publication and titles should be cited accurately. A good index is provided.

The book lacks several important subjects, such as meat and milk canning. In the section devoted to fruit canning it does not state whether plain or enameled cans should be used, although the need of proper cooling after processing in order to preserve color is carefully discussed in one instance. One suspects that the chapters on vegetable canning were written before C-enamels had come into use on cans for products other than sweet corn.

Experience in packing canned spaghetti leads one to differ with the statements in the book to the extent of declaring that on this one item it is quite unreliable as far as the production of a merchantable product is concerned.

The book is replete with formulas, many of which are excellent. It also contains formulas for several out-of-the-ordinary products, such as special vinegars, soya sauce, Worcestershire sauce, mushroom catsup, horseradish, plum pudding, sirups, and salad oils. Unfortunately, it gives three formulas for prepared mustard that call for the addition of mustard bran—and hence are illegal in the sense that the product would be liable to seizure under the federal, as well as some state, food laws.

Two other subjects for serious criticism of the book, for which the authors probably are in no way responsible, are the title and the material used for illustrations. Of 113 pictures, only 5 are illustrative of canning operations. The rest are catalog cuts of equipment that might be used by the food manufacturers, but they are of minor value in clarifying or explaining the text.

But, despite its faults, "Campbell's Book" is an addition to the literature of food preservation that is worth owning, although in some respects it must be used with great care. Its absence of a date or accurate citation of the source of so important a table of processes as the so-called Botulinus Cooks, given on page 204, is a most serious omission.

Before using any of the process times and temperatures of "Campbell's Book," one should obtain a copy of Bulletin 26-L of the National Canners' Association, Washington, D. C., which contains information based on recent research. This is recommended because many of the processes given in "Campbell's Book" for non-acid products are considered less safe than those given in the bulletin. The bulletin, incidentally, is effective until April 1, 1931.

An unsatisfied need still exists for books on canning, preserving, or pickling that treat the subjects from the standpoint of the operating man, written by men rich in operating experience, who know the importance of design, of the engineering involved in factory equipment and operation, who are familiar with the pitfalls of technology into which a superintendent is likely to fall, who understands the problems of management of people as well as machinery. Another desirable feature in such a work would be a discussion of the relationship of agriculture to quality of finished goods. An illustration of what is needed is found in "Campbell's Book" in the chapters on vinegar, on pickles, and on tomato products.

L. V. BURTON.

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MODERN METHODS OF COCOA AND CHOCOLATE MANUFACTURE. By H. W. Bywaters. P. Blakiston's Son & Co., Philadelphia, Pa., 1930. 316 pp. Price, $6.

IN THE text the author has translated valuable information from the technical to a non-technical classification. This should make the treatise of especial interest to the layman and the food manufacturer who has had but limited scientific training.

The style and arrangement of the book are interesting, and information as to history, occurrence of the cacao, its preparation and uses are decidedly educational. The application of special type machines to specific operations is decidedly informative and gone into more at length than is to be found in the average book of this character.

Notwithstanding the fact that there are already two treatises on this subject, which may have gone into the scientific side more at length than the book under consideration, still the reaction of the average chocolate manufacturer should be very favorable to this special treatise. It will be decidedly interesting as well as informative to him.

STROUD JORDAN.

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SANITARY CONTROL OF COMMERCIALLY PREPARED INFANT FOODS. By G. J. Hucker and Alice M. Hucker. Technical Bulletin No. 154, New York Agricultural Experiment Station, Geneva, N. Y. 16 pp.

THIS is a study of methods employed to control the numbers of bacteria in various types of prepared baby foods. The technology developed in some departments is somewhat similar to the bacteriological engineering technique now in use in plants of the Commercial Solvents Corporation, although not to the degree of pure-culture perfection required by the latter. Control of sanitation to the end that very low bacterial counts are possible in dry materials has been put into effect. It is of interest to note that the Grindrod impact sterilizer is in use at this plant.

* * *

CONFECTIONERY PROBLEMS. By Stroud Jordan. Published by National Confectioners' Association, 111 West Washington Street, Chicago, Ill. Confectionery Studies No. 1; May, 1930. 347 pp. Price, $5.

IN PASSING the problems of the confectionery industry in review before the eyes of the veteran to refresh his memory, and of the newcomer to acquaint him with the conditions as they exist, the author has put in book form the result of many years of technical study.

In addition to discussing the various

raw materials from their source to their utilization in finished products; the finished products from the selection of raw materials to consumption by the individual; and the problems encountered along the way; the author introduces his readers to instruments, methods, and need for control. He calls attention to the need for information that can be gained only through intensive research.

Written in non-technical language and from an unprejudiced viewpoint, this book is of much value both to the executive and to the operator. Fully Americanized terminology is used. Subject and topical indexing is employed. The final chapter calls attention to reference publications and contains a 6-page bibliography. E. S. STATELER

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THE POST-HARVEST DEPRESSION OF WHEAT PRICES. By Holbrook Working. Wheat Studies of the Food Research Institute, Vol. VI, No. 1; November, 1929; Stanford University, Calif. 40 pages. Price, $1.

BECAUSE of the present economic plight of those who grow wheat, this report is especially timely; although the hazards of growing basic cereals for a profit are of notoriously long standing. Here are compared variations in tendencies of cash wheat prices and of wheat futures, including consideration of size of carry-over and other modifying influences.

In discussing storage it is brought out that for 15 pre-war and 7 post-war years the costs of many dealers were barely met by their gross gains. This document denies the validity of the popular claim that post-season depression of wheat prices during the present century has been excessive, with resultant exorbitant profits from storage of wheat by dealers.

* * *

OUTLINES OF BIOCHEMISTRY. By Ross Aiken Gortner. John Wiley & Sons, New York, 1929. 724 pp. Price, $6.

THE first impression of the reader is that this volume contains more of chemistry and physics than of biology. This characteristic is particularly pronounced in the fore part, which deals with physical relationships. This is the best part of the book.

We know of no more readable and informative material on colloidal phenomena than those first chapters. The description of Abel's vividiffusion experiment on page 71 affords a real thrill in view of frequent statements that this or that is applicable to biological phenomena. This thrill is sufficient to carry one on to the chapter on gels, in which we believe the author is at his best. Here one is permitted to revel in analogies from the mechanism of earthworms and jellyfish to the rejuvenescence of man by the maintenance of a "high imbibition capacity of the tissue colloids."

To maintain interest, the author does not find it necessary to resort to crude analogies, as those quoted from Mathews and Bayliss; after all, it is a far cry from the act of dressing on a frosty morning to adsorption phenomena. One would appreciate, however, more illustrations drawn from life processes. The tender shoot which forces its way through the crust of hard earth, by which, according to a layman's reasoning, it should be crushed, or the root of a tree that splits asunder the granite boulder, are of more general interest than the pressure developed by swelling gelatin or starch, and involve colloidal phenomena just as profound.

Part II, on proteins, is well put together, but not novel. This is no fault of the author; protein chemistry has of late been quiescent.

In part III, on carbohydrates, after a brief respite, the author again finds his stride and from here on the food chemist will find much of value. It is unfortunate that, although photosynthesis is ably discussed, respiration in the vegetable kingdom, which is secondary only to photosynthesis, is so nearly neglected. This is to be ascribed in part to the fact that our information regarding its chemistry is woefully lacking.

Tannins, pigments, fats, lipoids, essential oils, vitamins, and enzymes are all ably treated. With the references given, the chapters allotted to these are worth much to anyone working in any of these fields.

Certain passages must be read with discretion. These merely remind one that the author is not infallible. For example, in the discussion of capillary attraction, the author apparently did not say what he intended. It is agreed that "ptomaines" are physiologically inert. Ptomaine poisoning, as known in the medical profession, however, is definitely ascribed to bacterial infection and has no relationship whatsoever to botulism caused by botulinus toxin. This is an error difficult to excuse.

It is contradictory to state that although the existence of vitamins seems to be well established, "it remains for chemistry to establish their existence through isolation, identification and synthesis," and in the next breath assert it has "been established for the rat, calf, and chicken that the liver contains an abundance of vitamin C when the animals have been fed for long periods or reared on diets which lack this factor." Who can vouch for the complete removal of vitamin C from the diets fed these animals and their inability to concentrate in their liver the small amounts possibly remaining in their diets? Until we cease applying to vitamins unwarranted properties over and above that possessed by many other dietary components, we may expect to continue to see the public exploited in spite of anything food officials may do.

Taken as a whole, the author of the book deserves our heartfelt gratitude for making available the enormous amount of material in such condensed form.

E. F. KOHMAN.

Government Publications

International Halibut Treaty, by John Pease Babcock and others. Bureau of Fisheries Document 1,073; 15 cents. Report of the International Fisheries Commission appointed under Northern Pacific Halibut Treaty.

Louisville Grocery Survey. Bureau of Foreign and Domestic Commerce Distribution Cost Studies No. 6; 15 cents. Part I—Census of Food Distribution, discusses this test study of distribution practices in America. Although relating to retail stores, the study and report have considerable value for all branches of the food industries.

Weights and Measures References. Bureau of Standards Miscellaneous Publication 103; 10 cents. A bibliography indexing the reports which have been made during the past 21 years at the National Conference of Weights and Measures Inspectors.

Manual of First-Aid Instruction. Bureau of Mines pamphlet; 15 cents. Valuable booklet for managers, superintendents, and foremen.

Workmen's Compensation Legislation. Bureau of Labor Statistics Bulletin 496; 55 cents. Describes workmen's compensation legislation of the United States and Canada as of Jan. 1, 1929, with text of legislation enacted in 1927 and 1928.

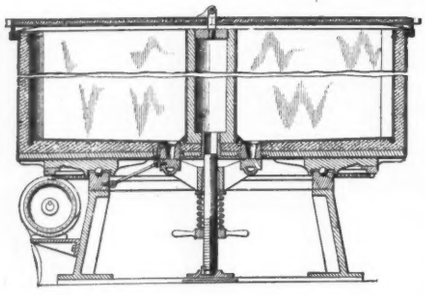
Foaming of Milk and Cream, by C. S. Leete. U. S. Department of Agriculture Circular 108; 5 cents.

Margarine Industry of Europe, by E. L. Thomas. Bureau of Foreign and Domestic Commerce Trade Information Bulletin 677, 10 cents. Statistical and trade description.

Foreign Trade Markets. Four Bureau of Foreign and Domestic Commerce documents as follows: The Market for Foodstuffs in Guatemala, Trade Information Bulletin 678, 5 cents; Dried-Fruit Industry and Trade of South Africa, Trade Information Bulletin 676, 10 cents; Market for Dairy and Barn Equipment and Silos in South Africa, Trade Information Bulletin 668, 10 cents; and Foreign Trade in Fresh Fruits, by Daniel J. Moriarty, Trade Promotion Series No. 90, 25 cents.

Selected Patents

Non-foaming Pasteurizer. — Cornelius Mortensen, Louisville, Ky. No. 1,749,257. March 4, 1930 — This pasteurizing mechanism is designed to eliminate foaming, to reduce number of parts, and to facilitate cleansing. It consists of a rotating holder, made up of one or more non-communicating compartments adapted to hold the liquid at the required temperature and for the required time;



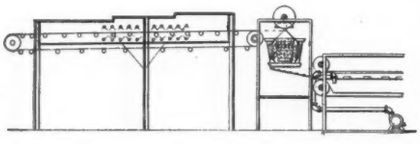
of a non-foam producing valve, part of which is carried by rotating holder while the other part is held in non-rotating position; and of a means for preventing leakage of liquid not properly treated through outlet to the cooler or to other adjacent compartments.

* * *

Production of Soluble Albumin — Elizabeth M. Meyer, New York, N. Y. No. 1,754,521. April 15, 1930—Soluble albumin is produced by agitating fully washed milk casein in a large amount of suspended hydrate of lime, separating the solution from the lime solids, evaporating the clear solution to give a flake-like albuminous product, packing the flake-like product with dibasic calcium phosphate, and mechanically separating the phosphate from the albumin.

* * *

Dry Steam Treatment for Blanching Fruits and Vegetables—John J. Nevills, Sacramento, Calif. No. 1,753,902. April 8, 1930—The material to be treated is subjected to dry steam at a temperature varying from 400 to 800 deg. F. for 2 to 5 seconds. It is claimed that the dry



steam sears and loosens the skins without injury to the fruit or vegetables, and makes possible the subsequent removal of the skins.

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Glutamic Acid—Karl Bromig, Frankfort-on-the-Main, Germany, to Deutsche Gold & Silber Scheideanstalt Vormals Roessler, Frankfort-on-the-Main, Germany. No. 1,755,683. April 22, 1930—Glutamic hydrochloride with a melting point of 192-193 deg. C. is produced from sugar residues without the use of alcohol. This is accomplished by treating the sugar residues with hot concentrated hydrochloric acid, separating the hot solution from remaining solids, and crystallizing out the glutamic hydrochloride by cooling and saturating the cold solution with hydrochloric-acid gas. Purification of the crystals is accomplished by dissolving them in dilute hydrochloric acid, filtering through charcoal, and reprecipitating by saturating the filtered solution with hydrochloric-acid gas.

* * *

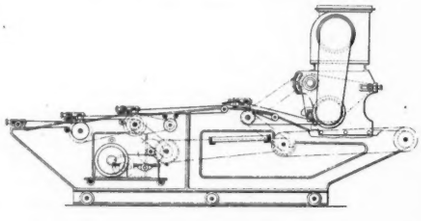
Treating Butter — Charles Hoffman and Thomas Robert Schweitzer, to Ward Baking Company, New York. No. 1,749,427. March 4, 1930—A method of improving whipping quality of butter for cake manufacture, by uniformly mixing its constituents at a suitable temperature and then properly refrigerating to harden the butter fat.

* * *

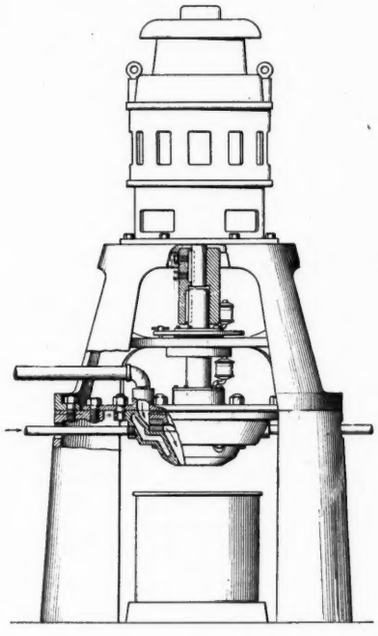
Condensed Milk Product — Thomas O'Connor, Minneapolis, Minn. No. 1,749,153. March 4, 1930—This consists of 28 to 30 per cent milk solids, 7 to 9 per cent sodium chloride, 20 to 30 per cent sugar and 35 to 41 per cent water by weight. It is claimed to be self-preserving, economical to handle, and readily miscible with further quantities of water and other ingredients of dough.

* * *

Oven Emptied Mechanically—George Ralph Baker, Claude Dumbleton, and John Currie Paterson, London, England, to Baker Perkins Company, Inc., Saginaw, Mich. No. 1,750,452. March 11, 1930—To provide automatic operation from introduction of the biscuit into the oven to the delivery of the finished product, the apparatus removes biscuits from trays of traveling conveyor and stacks them. It consists of a suction nozzle, a perforated bottom for nozzle, an air-pervious band, a plurality of conveyors in series driven at various speeds, and a means of driving the conveyors and the air-pervious band.



Vertical Colloid Mill — William Eppenbach, College Point, N. Y., to United States Colloid Mill Corporation, Long Island City, N. Y. No. 1,755,576. April 22, 1930—Although the mill is vertical in type, the homogenizing elements lie in a horizontal plane. The material to be treated feeds through a peripheral region exterior to the elements for treatment within the horizontal gap. The rotating portion of the emulsifying, grinding, or



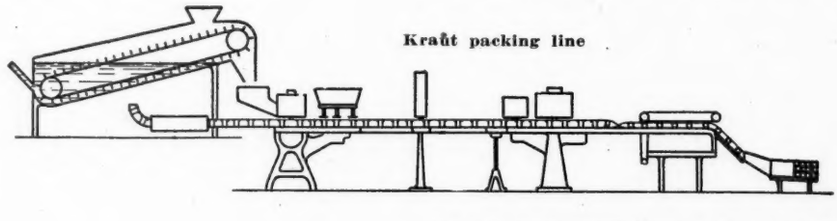
homogenizing elements is adjustable for speed of rotation and for gap between the rotating and the non-rotating portions, to regulate the degree of action obtained. The rotating portion is capable of being efficiently lubricated without the lubricant contaminating the material, and of being dismantled for cleaning, inspection, changing of grinding element, or repair. The treated material discharges under gravity.

* * *

Clarification of Sugar Beet Juice — Arthur W. Bull, Naugatuck, Conn., to the Dorr Company, New York, N. Y. No. 1,755,165. April 22, 1930—In this departure from prior art, the beet juice is treated so that it does not become saturated with dissolved lime. It is claimed that the purifying and clarifying steps may be accurately controlled, that a better separation of solids and liquor may be effected, and that the beet juice at the end of the process is of a uniformly high grade.

* * *

Kraut Sterilization—Oswald H. Hansen, Port Washington, Wis., to Hansen Canning Machinery Corporation, Cedarburg, Wis. No. 1,750,467. March 11, 1930—This is a process of and apparatus for preserving kraut in which kraut is

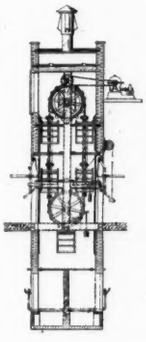


Kraut packing line

treated in bulk to separate individual fibers and simultaneously to bleach and sterilize it prior to being packed. A definite quantity of brine is added to measured quantities of kraut before sealing of containers. Containers may or may not be labeled mechanically before packing.

* * *

Vertical Meat Treating Chamber — Arthur E. Ozouf, Chicago, Ill., to the Allbright-Nell Company, Chicago, Ill. No. 1,755,966. April 22, 1930—In this combination vertical meat conveyor and curing chamber, air pockets and areas of unequal curing conditions are claimed to be eliminated. It is designed to dry, smoke, and cure such meat products as frankforts, sausages, minced ham, bacon, and ham, with a saving of 50 to 75 per cent in time of treatment, and of 50 per cent in shrinkage.

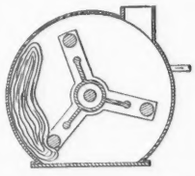


* * *

Yeast and Starch Food Product — Elmer B. Brown, Charles N. Frey, and Harvey H. Harkins, New York, N. Y., to Standard Brands, Inc., Dover, Del. No. 1,755,864. April 22, 1930—For use in commercial manufacture of leavened white bread, a food product is made by hydrolyzing a mixture of starch and yeast with a mixture of dilute hydrochloric and sulphuric acids under pressure until practically all the starch has been converted into sugar. The acidity of the resulting product is neutralized with ammonia, acidified slightly with lactic acid, filtered, and concentrated in vacuo to a sirup of desired density. The extract solution may be decolorized by use of charcoal, boneblack, or activated carbon before being concentrated.

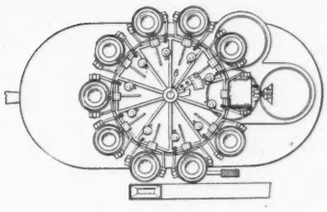
* * *

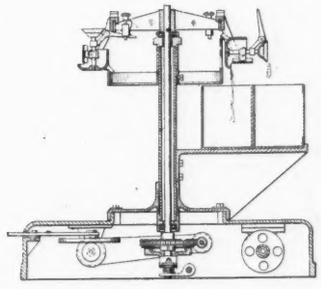
An Improved Temperature Regulated Dough Kneader—James C. Gordon, Detroit, Mich. No. 1,750,002. March 11, 1930—The contents of this kneader are held at relatively low and uniform temperature, by the fanlike action of the kneading arms, that keep the air inside the machine constantly in motion and in contact with the dough. The air is cooled by water, brine, or ammonia flowing through the hollow central shaft.



* * *

Separating Whites and Yolks of Eggs —John W. E. Skholme, East Orange, N. J. No. 1,747,432. Feb. 18, 1930 — Yolks and whites of eggs are automatically collected in different containers, and provision made to eliminate spoiled eggs and those with broken yolks, on a rotating table containing a number of separating devices each adapted to receive a single egg, as shown in the figure. The operator breaks an before her, and the receptacle containing egg as each receptacle is advanced





the egg moves immediately to the next position. At a convenient point, a mechanism tilts the receptacle and discharges the white and yolk into separate containers. The receptacles are loosely mounted in the frame, and in case a spoiled egg is detected, the receptacle and its hanger can be removed and a clean one substituted without slowing up operations.

Copies of Patents

Complete specifications of any United States patent may be obtained by remitting 10c. to the Commissioner of Patents, Washington, D. C.

Photostatic copies of foreign patents may be obtained at the same address, prices being forwarded on application.

Purifying Cod-Liver Oil for Use in Margarin—John C. Hamilton, Mountain Lakes, N. J., et al., to Best Food, Inc., New York City. No. 1,745,851. Feb. 4, 1930—It is desirable to add a certain quantity of cod-liver oil in the manufacture of nut margarin to supply vitamins to the final product. To remove the characteristic odor and taste of the oil from the product, the oil is purified by agitation with an alkali, settling, and filtering, and by then passing the oil through activated carbon while carbon dioxide or a similar gas is being passed through the carbon in the opposite direction.

* * *

Malt Wort in Cheese—Livingston A. Thompson, Waukesha, Wis. No. 1,745,962. Feb. 4, 1930—The food value and palatability of cheese is said to be increased by the addition of malt wort. In carrying out this process, milk is treated to about 120 deg. F. and an amount of malt wort equal to 20 per cent of the milk is added. The temperature is maintained for 30 minutes to allow partial digestion of the casein by wort enzymes. On cooling, addition of rennet causes the wort to be occluded in the coagulated casein. The cheese is thereafter treated in the usual manner for Cheddar cheese production.

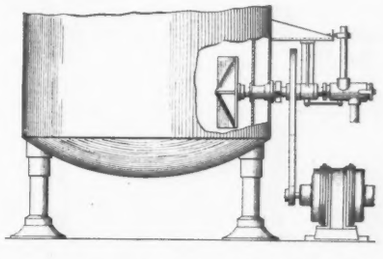
Treating Creamery Waste—John T. Travers, Columbus, Ohio, to Ohio Sanitary Engineering Corporation, Columbus, Ohio. No. 1,747,802. Feb. 18, 1930 — Creamery wastes containing casein and albumin, ordinarily in the colloidal form, and suspensoids of fat, as well as acids resulting from the decomposition of these materials, are purified by the addition of a treating mixture composed of electrolyte-producing material such as calcium sulphate, alkali sufficient to neutralize the acids present, and a coagulant such as ferrous sulphate.

* * *

Raisin Sirup—Julian K. Dale, Fresno, Calif., to Sun Maid Raisin Growers of California, Fresno, Calif. No. 1,746,993. Feb. 11, 1930. Also Henry W. Denny, South Orange, N. J., to Sun Maid Raisin Growers of California. No. 1,746,994. Feb. 11, 1930—A raisin sirup from which acid tartrates, tannin bodies, and a substantial portion of coloring matter have been removed is prepared by one of two methods. Concentration of the raw extract from the raisins to about 60 deg. Brix, causes crystallization of a large portion of the tartrates, and addition of lime to the filtered liquor after diluting will remove further tartrates as well as tannin bodies and other non-sugars. After proper filtration, addition of phosphoric acid followed by caustic soda precipitates the lime. Further acidification and filtration with vegetable or bone char gives a clear product and final evaporation follows. The method covered by Patent 1,746,993 obviates the use of lime by a caustic-soda precipitation after heating to 65 deg.—75 deg. C. Acidification to a pH value of 5.5 with hydrochloric acid precedes char filtration and concentration.

* * *

A Cooling Agitator—George E. Wallis, Wenham, Mass., and John C. Scovel, Jr., Chicago, Ill., to Creamery Package Manufacturing Company, Chicago, Ill. No. 1,748,320. Feb. 25, 1930 — This



mechanism combines cooling and agitating functions in a simple unit to make unnecessary the cooling of contents from walls of container. The refrigerant flows within the hollow agitator as shown in the illustration, the container itself having ordinary insulated walls.

* * *

Dressing Poultry — George C. F. Bruens, Louisville, Ky. No. 1,746,100. Feb. 4, 1930—Poultry to be placed in cold storage are killed, exposing the jugular veins to allow free flow of blood, and allowed to "kick out" to permit outflow of blood. They are then scalded, plucked, and the entrails removed. Following chilling in water to 40 deg. F., the breast bones are removed and the birds thoroughly washed in a centrifugal washer until the water is no longer discolored. They are then dried in a centrifugal dryer.

Manufacturers' News And Equipment

New Lift Truck Has Valuable Features

EASIER and safer operation is said to be provided by several innovations incorporated on the Red Junior Barrett lift-truck, recently placed on the market by Barrett-Chambers Company, 1328 West Monroe Street, Chicago, Ill. A spring handle hold-up eliminates the danger of tripping over the handle as it lies on the floor. This feature also takes the weight of the handle out of the truckers' hands when in use, so that all his energies may be concentrated in

pulling. An automatic engaging latch for lifting loads does away with the necessity for stepping on a foot pedal prior to lifting a load.

The truck is equipped with Hyatt roller bearings and Alemite lubrication. It has a capacity of 2,500 lb., and is available in more than 120 standard stock models.

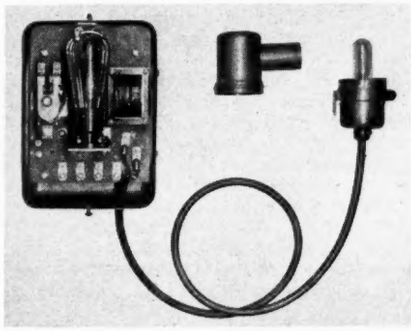
Alloy Milk Tank Holds 6,200 Gallons

A LARGE storage tank for milk, 10 ft. in diameter and 10 ft. high has recently been fabricated by the Alloy Products Corporation, 576 Clinton Street, Milwaukee, Wis. The tank was built for the Waupin (Wis.) dairy plant of Libby, McNeill & Libby. It is made of $\frac{1}{8}$-in. Allegheny metal with all seams butt-welded and ground smooth on the inside. An 18-in. manhole and cover, 3-in. "nofome" inlet, 3-in. outlet, agitator motor drive, thermometer fitting, and adjustable pipe legs were included in the work.

The huge tank presented several difficult transportation problems. It was necessary to remove part of the building wall to get it out of the factory, and special permits had to be obtained before it could be transported by motor truck and trailer. The illustration shows the tank mounted on the trailer for shipment.

Relay Is Operated by Beam of Light

A PHOTO-ELECTRIC RELAY with numerous uses in automatic control has been announced by the General Electric Company, Schenectady, N. Y. It can be used for counting bags, boxes, or vehicles as they pass a definite point; for sorting materials or packages according to size, shape, or reflecting power; for operating bag-piling mechanisms, and for controlling lights or signals by the intensity of outside light. Its use for controlling factory lighting is particularly interesting, for it can be set to turn on artificial lights



Manufacturers' Publications

Food Plant Sanitation—A 20-page booklet published by Mathieson Alkali Works, Inc., 250 Park Ave., New York, N. Y., treats of the use of a sodium hypochlorite powder in food manufacturing plants.

Colloid Mill and Homogenizer—In a 16-page, well illustrated booklet the U. S. Colloid Mill Corporation, Long Island City, N. Y., gives specifications and constructional details of its products.

Colorimetric pH Control—Braun-Knecht-Heiman Company, 576 Mission St., San Francisco, Calif., announces a pamphlet entitled, "Permanent Colorimetric pH Standards for the Control of Industrial Processes."

Water Softening—The Elgin Softener Corporation, Elgin, Ill., announces the availability of a new 16-page bulletin, No. 120, entitled "The Economy of Soft Water."

Oils for Refrigerating Machinery—The York Ice Machinery Corporation, York, Pa., in a leaflet entitled "Yorkco Oils for Refrigerating Machinery," calls attention to its different grades of oil prepared for this purpose.

Milk Cooling Units—In bulletin No. 205, are described apparatus of this type, manufactured by Brunswick-Kroeschell Company, New Brunswick, N. J.

Compressors—Bulletin No. 788, second edition, has been issued by the Chicago Pneumatic Tool Company, 6 East 44th St., New York, N. Y., describing and illustrating its vertical, single-cylinder, single-acting type of compressors.

Glass-lined Cookers—Bulletin 710, giving the constructional details of the glass-lined cooker for tomato products, manufactured by the Pfaudler Company, Rochester, N. Y., is available from the Food Equipment Division of this company.

Refrigeration Systems—Brunswick-Kroeschell Company, New Brunswick, N. J., in its bulletin No. 201, second edition, treats its ammonia system refrigeration.

Boilers and Steam Engines—Equipment of this type designed for bottling and canning plants has been fully dealt with by James Leffel & Co., Springfield, Ohio, in its bulletin No. 213.

CO_2 Refrigeration—The diversified applications of CO_2 refrigeration are treated in an attractive booklet, "Carbonic Anhydride System," put out by Brunswick-Kroeschell Company, New Brunswick, N. J.

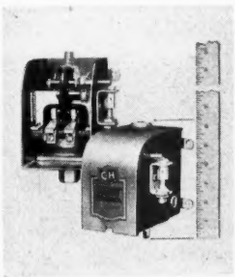
Evaporated Milk—Statistical Data, a new publication issued by the Evaporated Milk Association, 203 North Wabash Ave., Chicago, Ill., gives information on evaporated milk not otherwise available.

whenever the daylight intensity falls below a predetermined level and to turn them off again when the outside light increases, whether the darkness be caused by storm, fog, or nightfall.

The relay controls an electric circuit in response to an increase or decrease in the amount of light on the photo-electric tube. When connected to a magnetic counter, for example, the shutting off of a beam of light by materials passing on a conveyor operates the relay and records the passage. It can be operated at speeds as high as 100 times a minute. An illustration of the device with the covers removed is shown below. For outdoor use, it may be mounted in a waterproof case.

Small Pressure Regulator

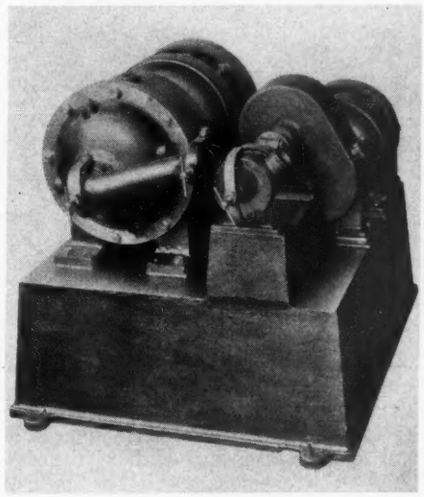
FOR maintaining pressure in systems containing water, air, gas, or other fluids, a new single-pole pressure regulator, exceptionally small in size, has been developed by Cutler-Hammer, Inc., 12th Street and St. Paul Avenue, Milwaukee, Wis. The regulator can be used as a starting switch on motors up to 1 hp., 230 volts, or as a pilot switch in the control circuit for larger motors. It closes the circuit at a low pressure



and opens it at a high pressure setting. Adjustment permits opening of the circuit at any pressure from 30 to 200 lb. Double-break silver contacts are used, and working metal parts are cadmium plated.

Colloid Mill Constructed Of Alloy Steel

SEVERAL improvements in the colloid mills manufactured by Chemicolloid Laboratories, Inc., 90 West Street, New York City, have been incorporated in the new models. These colloid mills



are suitable for homogenization, disintegration and dispersion, intimate mixing, and the grinding and extraction of fibrous materials. In addition to the hydraulic shear between the moving and stationary element, upon which smooth surface mills depend for their action, the Charlotte colloid mills have a number of grooves in the roller and stator. Eddy action in these grooves subjects the material to a beating and chopping action which supplements the shear.

The new models are especially easy to dismantle and clean. Five commercial sizes, ranging in capacity for 100 to 5,000 gal. per hour are available, as well as a laboratory size. The mill shown in the illustration is particularly suitable for uses in which corrosion is a problem, being entirely constructed of Allegheny metal.

◂◂ Editorial Correspondence

Frozen Sweet Corn

A. F. Yeager, Horticulturist, of the North Dakota Agricultural Experiment Station at Fargo, has been experimenting with the production of frozen sweet corn. His reply to our inquiry for a description of his work follows:

To the Editor of FOOD INDUSTRIES:

Our work with the freezing of sweet corn can hardly be classed as anything more than preliminary. We handled corn in only one way and at only one temperature, but this proved satisfactory. The corn was frozen on the ear with the husks on. Fresh corn was taken immediately from the field, put into storage at a temperature of from –4 to –10 deg. F., and left until it was taken out for cooking six months later.

In making a commercial success of this method of handling corn, it would seem necessary to me that the product be taken quickly from the field to the storage. When it is removed from storage it should be kept in a frozen condition until delivered to the consumer. This would necessitate handling in a manner somewhat similar to ice cream. As to whether we used the best temperature is another thing which would stand investigation.

In handling frozen corn, we found it quite easy to deliver it frozen to the kitchen, because the corn is handled in midwinter and the husk around the ear acts as a good insulator and prevents rapid thawing. I believe there is no question but what the handling of fresh vegetables in a frozen condition, particularly such a one as sweet corn, is due for a big expansion in the next few years.

A. F. YEAGER,
Horticulturist.

* * *

The Wholesale Grocer And Frozen Foods

At the request of FOOD INDUSTRIES, *a wholesale grocer, who has been thinking earnestly about the new problems of frozen-food distribution, was asked to give his analysis of the function of the wholesaler in the scheme of things. His reply not only defines his place but goes further by pointing out the logical method of distribution in the pioneering stage of frozen-food marketing. We should like to hear from other jobbers, as well as ice-cream manufacturers. The Springfield experiment of General Foods Corporation emphasizes the necessity for everyone concerned with the processing or distribution of perishables to determine in what way he shall react to the newly popularized method of food preservation.*

To the Editor of FOOD INDUSTRIES:

We are running a wholesale grocery in a city of 18,000 population. Locally, we cannot see where frozen foods will in any way affect us for quite a number of years. By "affecting us" we mean either through decreased profit by not handling or increased profit in handling.

We believe there are very few wholesale grocers in cities of this size who have either warehouse equipment or the distributive equipment to take care of these products. We sell goods in towns all of which are smaller than Vincennes, and the trade in all small cities or towns is very slow to take on new methods and new products. Retailers will be exceptionally slow to add a line of frozen foods, since it will mean an additional investment in equipment, with a very slow demand.

Some of the more progressive retailers will naturally be interested, but these will be supplied not by the local jobbers but by out-of-town jobbers located in larger cities. In every city of this size there are certain food handlers who already have the necessary equipment and have already a distributive system that can be, with little expense, made over to handle frozen foods. In Vincennes there happens to be an ice-cream and butter manufacturer who makes store-door delivery over a wide territory on fresh milk, cream, butter, cheese, and ice cream. This gives them a distributive system. The very nature of their manufacturing gives them equipment for handling and storing such perishable products.

In other towns it might go to the produce houses, which ship frozen poultry and which service the retailers on eggs, chickens, and the like.

We believe it is only a question of a few years until the wholesale grocer will have to get into this business, but the time is not yet here for that.

E. BIERHAUS & SONS.
Vincennes, Ind.

News of the Month

Tariff Bill Adoption Appears Certain; Will Affect Food Manufacturers

By Paul Wooton
Washington Correspondent

TARIFF readjustment has run rapidly through the past month, has passed its critical period, and now nears completion with the bill's approval almost a certainty. Though the debenture is out, the bill remains a farm measure. Sugar is at 2c. per 100 lb. against Cuba, the present rate being 1.76c. Agricultural items in general stand at the high level tabulated in last month's issue of Food Industries. The table given at that time may be used to make conversions between the old act and the new. A glance through the whole page of agricultural changes will show how sharply upward the farm tariffs have gone and what a range of items have been affected.

Whatever the effect of the new tariff, be it great or small, the food-processing industries are to bear a full share of its costs. The innovation about this tariff is that it embarks into the principle of high protection for raw materials, especially agricultural raw materials in the food line.

Figures prepared by the Tariff Commission show that two-thirds of the increase in rate level between the 1922 and the 1930 tariffs can be traced to farm protection. In round numbers, speaking in terms of equivalent *ad valorem* duties on the basis of 1928 imports, the rate structure of the entire tariff has advanced from 34 per cent to 41 per cent, a 7 per cent increase. Agricultural raw materials have gone from 38 per cent to 49 per cent; manufactured goods having compensatory duties on account of agricultural raw materials, 36 per cent to 49 per cent; industrial products from other sources, 34 per cent to 41 per cent. When the accounts are properly balanced by weighting according to the import value of the different commodities, it is shown that of the 7 per cent increase through the entire bill, nearly 5 per cent is due to increase on agricultural raw materials of their compensatories.

Speaking in terms of import value, the raw materials, including the items which food-processing industries have to worry about, bordered on $461,000,000 for 1928. The computed *ad valorem* increase is given as 10.8 per cent. On this basis, the added customs duty would be close to an even $50,000,000. Obviously all of this will not reflect directly to any given group of American citizens. Imports of some commodities will shrink or vanish under the new tariff; others will increase in spite of it.

Probably the effect will be absorbed without being felt tangibly. Its first result probably will be a slight price decline on some items, such as sugar, due to dumping in anticipation of the new rates. After this slack is taken up, the price reaction will, on the basis of past experience, be very hard to trace to tariff causes, especially if the index level continues downgrade. Though some items will tend to pyramid the duties, some will absorb them.

Nevertheless, it is obvious that the buyers of protected items are in some manner paying the customs duties either in part, in full, or double. In other words, tariff must be reckoned as an overhead, perhaps invisible, by purchasers of commodities in the import list.

New Company Will Make Freezing Equipment

FORMATION of a new organization for the manufacture of equipment for freezing foods has recently been announced. The Quick-Freeze Corporation, as it is known, will put on the market equipment embodying several novel developments invented by G. R. Fennema and F. X. Burke, both of whom formerly were identified with Kolbe Instant Freezing Systems. The equipment will be constructed by the Latendorf Conveying Corporation, Bayonne, N. J., well known manufacturer of bakery equipment.

Charles B. Latendorf is president of the new company, F. X. Burke is executive vice-president and general manager, and G. R. Fennema is secretary-treasurer. It is an entirely independent organization.

In addition to furnishing commercial installations of various types and sizes for rapid freezing of foods, the company will build small freezers capable of close temperature regulation for preliminary experimental use in determining optimum freezing conditions.

COMING EVENTS

JUNE

2-6—Association of Operative Millers, Buffalo, N. Y.
3-6—National Confectioners' Association of the United States, Chicago, Ill.
4—American Cider Vinegar Manufacturers' Association, Rochester, N. Y.
4-6—American Institute of Chemical Engineers, Detroit, Mich.
24-26—National Macaroni Manufacturers' Association, Niagara Falls, Ont.
24-26—American Dairy Science Association, Ames, Iowa.

JULY

29-30—National Syrup and Molasses Association, Atlantic City, N. J.

Glass Container Group Hears Value of Market Study

THE VALUE of market surveys for the glass-container industry was emphasized at the annual convention of the Glass Container Association, held at Atlantic City, N. J., April 30-May 2. President Philip I. Heuisler made a plea to members to go after their own share of business without indulging in price cutting to get part of a competitor's business. E. G. Ackerman, assistant business manager of the association, reported that his department had made 238 market studies for 156 companies, some of which resulted in abandonment of plans to promote further overdevelopment of manufacturing capacity.

John D. Biggers, president of Libby-Owens-Ford Glass Company, showed how the conditions of the industry could be improved by market studies similar to those made by the automotive industry. He also urged that adequate use of statistics be made. Salesmen should interview—not merely call. Mr. Biggers stressed the futility of cutting prices to cost, or even lower, merely for the sake of maintaining volume.

Donald McConaughy, of N. W. Ayer & Son, Inc., stated that women now controlled from 80 to 85 per cent of total retail purchases approximating $40,000,000 annually. He pointed out how necessary it is for those who want their share of this market to employ the color and artistic appeal necessary to interest women.

Business in glass containers has declined 7.7 per cent for the first quarter of 1930, it was reported at the meeting. Philip I. Heuisler, president, Maryland Glass Corporation, of Baltimore, was re-elected president of the association for the third consecutive term.

Margarin Bill Is Passed by Senate; Other Food Legislation

AFTER spirited debate, the oleomargarin bill passed the Senate on May 26 by a vote of 44 to 22, with no significant change from the form that passed the House last February. No obstacle is foreseen to prevent the bill from becoming law effective in 12 months' time. As explained on page 139 of FOOD INDUSTRIES for March, 1930, the measure is aimed at a new class of products which fall outside the present scope of the oleomargarin act.

These so-called artificial cooking compounds are made by emulsifying with water and salt a mixture about 85 per cent coconut oil plus peanut oil. They often are colored and flavored to resemble a low grade of butter, but no deception has been charged except in some restaurants. Such compounds have enjoyed an expanding market, because they escape the tax of 10c. per pound on artificially colored and ¼c. per pound on uncolored oleomargarins and because they can be sold at any grocery without payment of the license tax of $480 per year by wholesalers and $48 by retailers.

Comparatively little defense was offered for the measure, pressure of the powerful dairy group in the Senate making its passage more or less certain in advance. Opposition developed on party lines, some of the Southern Democrats attacking the bill. Some who opposed the original oleomargarin bill joined in because they thought the oleomargarin legislation has injured the market for cottonseed oil and other southern products in favor of the dairy interests.

Margarin manufacturers have not opposed the bill, but they have been holding their breath lest some broader regulatory power be slipped in with it. Apparently they have wished to see the vegetable product taxed in order that it may be placed on the same basis as the naturally colored margarins made by a number of producers.

AMENDMENTS OFFERED

The main Senate debate on the oleomargarin bill started on May 23, Senator Norbeck offering the measure in the form in which it passed the House last February and which was subsequently approved by the Senate Committee on Agriculture and Forestry.

Several floor amendments were offered and rejected. It was sought to extend the scope of the bill so that naturally colored oleomargarins, now at the quarter-cent rate, would be taxable at 10c. per pound. This would have particularly hit the so-called "packers' product," animal margarin colored by natural oils, the production of which is about equal to that of the vegetable fats included in the bill. Some Senators advanced the contention that with the competing vegetable product out of the way, the naturally colored oleomargarin will be produced in much larger quantities and should be held down. Against this viewpoint was the argument that the supply of naturally yellow oils is limited. Some authorities state that this is not the case and that several naturally yellow animal and vegetable oils are obtainable in sufficient quantity to boost the output to a high figure should the demand justify it.

Another rejected amendment sought specifically to exclude from the pending legislation liquid emulsions, pharmaceutical preparations, oil meals, liquid preservatives, illuminating oil, cleaning compounds, or flavoring compounds. Supposedly these are excluded under the interpretation of the law through other provisions already in the act. Another amendment would have reduced the charge by which wholesalers and retailers are licensed to sell oleomargarin and which restricts its handling to a comparatively few dealers. A further amendment was proposed on May 26 to cut the margarin tax from 10c. to 5c. per pound, but this too was rejected.

EFFECTIVE IN 12 MONTHS

An amendment was accepted to make the bill effective 12 months instead of 6 months after passage, in order that the manufacturers concerned could have more time to readjust. "This point," said Senator Heflin, among the bill's chief opponents, "is a pitiful one to me. It is that people engaged in these honest industries must have time to get out of them. What wrong have they done? None whatever. I think the bill is the worst piece of legislation which has been before this body in a long time."

Several Senators challenged the oleomargarin bill as a whole, deeming it class legislation almost unique in America. Oleomargarin already is so rigidly regulated, they pointed out, that its extension to the new artificial product is not justified merely because a few restaurants are serving quarter-ounce pats of this material in place of butter.

With a preferred position on the Senate's legislative program, the McNary-Mapes bill requiring that substandard canned food shall be so labeled is expected to reach final enactment this session. Repeated objections from Senator Copeland had prevented consideration of the bill until its importance was recognized by the Senate steering committee. Mr. Copeland has proposed two amendments that are practically certain to meet defeat. One relates only to procedural detail in the administration of the bill, but the other strikes out all the existing provisions and proposes as an alternative that the Secretary of Agriculture be authorized to establish standards and definitions with respect to the identity or composition of any food. This amendment is so broad in scope that it would defeat the practical purpose sought in the McNary-Mapes bill, and is opposed by Senator McNary and other adherents of the measure in the upper house.

The House passed the bill on May 7. An amendment offered by Representative Franklin Menges, of Pennsylvania, providing that all standards which have been or may be established for canned foods under other acts shall, for the purposes of the Mapes bill, be adopted as the official standards, was ruled out on a point of order.

Mr. Menges stated that the purpose of his amendment is to protect the standards for various kinds of canned foods that have previously been established by the department and also to leave the way open for the establishment of a complete system of permissive standards as contemplated in the Hope bill now pending in the House Committee on Agriculture.

Favorable action by the House Committee on Agriculture on the Hope bill providing for the establishment by the Department of Agriculture of permissive standards for all grades of canned foods is expected before the end of the session. This measure is indorsed, in principle, by officials of the Food and Drug Administration, but they are understood to be opposed to the provision for declaring the grade on the label. They argue, in support of this objection, that unless the department actually takes charge of the grading in the canning plants it would be practically impossible to obtain convictions for misbranding under such an elaborate system of grades.

Representative Hope states that in his opinion the bill would be of little use unless the canners were permitted to place the grade description on the label, and he is confident that the committee will report the bill in that form. A feature of the bill that probably will be clarified before the bill is reported relates to its administration. The Bureau of Agricultural Economics now is grading various foodstuffs for the purposes of establishing their loan value under the terms of the U. S. Warehouse Act. Inasmuch as the standards proposed under the Hope bill are permissive, the question has been raised whether the administration of this bill should not be placed in the Bureau of Agricultural Economics rather than the Food and Drug Administration.

MARKETING PERISHABLES

The Borah-Summers bill to regulate the marketing of perishable foodstuffs by licensing commission merchants, dealers, and brokers and by imposing penalties for the repudiation of contracts and other unfair and fraudulent practices, also is approaching final enactment. The bill finally passed the House on May 14 with an amendment eliminating poultry and eggs. As originally drafted, the bill applied only to fruits and vegetables. Rewritten in the House Committee on Agriculture, the bill was extended to cover poultry and eggs, and most of the opposition that the measure encountered on the floor was centered on this provision. After an amendment ex-

cluding these products was adopted by a vote of 76 to 73, a motion to recommit the bill was defeated by a vote of 224 to 64. Although the bill passed by the House is a substitute drafted in the House committee for the bill passed by the Senate in June, 1929, the measure probably will go to the President before the end of the session after differences between the two versions have been reconciled in conference.

Several other measures of vital interest to various branches of the food industry have made rapid progress toward enactment in recent weeks, but with the approach of adjournment it is probable that they will not get any further this session. The Jones-Haugen bill to establish compulsory standards for preserve, jam, jelly, and apple butter passed the Senate on May 7 after the Senate Committee on Agriculture had adopted the bill in the form previously reported by the House committee. The only opposition to the bill in the Senate was voiced by Senator Copeland, who declared that the provision requiring that the saccharine substances used shall be declared on the label is an "unfortunate discrimination" against corn sugar.

Preserve Bill Held Up

The preserve standards bill still is on the House calendar and is not likely to come up again until December, 1931! This long delay is due to the fact that the House Committee on Agriculture probably will not get the call on calendar bills until the next Congress. In the ordinary course of events, other committees of the House will have the right of way at the last session of the present Congress next December. Representative Haugen, chairman of the committee, states that he is loath to make a request for a special rule bringing up the bill because of the generous treatment that has been accorded in this Congress to the Agriculture Committee.

The National Preservers' Association will oppose amendments made to the bill in committee requiring that the presence of added pectin and fruit acids be declared on the label. As pure preserves contain only one-tenth of one per cent of additional pectin, Daniel R. Forbes, counsel for the association, states that this provision of the bill would be unenforceable because the presence of this small quantity could not be detected.

To Appeal "Bredspred" Case

During the delay in remedial legislation, the Department of Agriculture expects to carry to the U. S. Supreme Court the litigation involving the sale of "Bredspred," a product of the Glaser, Crandell Company, Chicago. The department has appealed to the federal circuit court of appeals from the decision of the district court at Davenport, Iowa, holding that this product is exempt from the requirements of the food and drugs act because it is sold under a distinctive name.

New varieties of fruits, vegetables, and other plants propagated by grafting and budding, are made patentable under the Townsend-Purnell law, approved by President Hoover on May 23. After years of poorly rewarded experimentation, the inventors of new plants finally have been given a financial incentive for promoting and improving the nation's food supply. Under the terms of the law, passed by the Senate on May 12 and by the House on May 13, the discoverers of new and distinct varieties of plants are given exclusive rights to propagation for a period of 17 years, the same term as under industrial patents.

Tenderness of Meats Tested by Machine

A MACHINE which tests the tenderness of meats by the amount of pressure necessary to force a knife blade through the sample has been developed by the U. S. Department of Agriculture. Although not yet perfected, the apparatus has been used on more than 2,000 samples of pork, beef, and lamb, with results that are in remarkably close accord with scorings made on the samples by expert judges of tenderness. The apparatus is simple and easily portable. It consists of a blade so arranged that it may be drawn through the meat samples by turning a crank. A scale records the amount of pressure required.

A co-operative research program in which the Department of Agriculture and 25 state experiment stations are seeking to discover what factors cause tenderness in meat led to the development of the machine. One of the most interesting conclusions that the tests have already shown is the fact that the tenderness of meat may be partly hereditary. This belief was advanced only after careful study of the records of a large number of animals.

Directors of Canners' Association Meet

DISTRIBUTION continues to be the outstanding problem of the canning industry, President C. E. Hume reported at the May 21 meeting of the board of directors of the National Canners' Association, at Washington, D. C. Consideration of other subjects of great interest by the directors resulted in: the appointment of a committee to investigate the machinery necessary for collection of statistics of the industry month by month; the decision to continue the morning broadcasts to housewives; ratification of the executive committee's intervention in a freight-rate case in which the association opposes only the principle of changing the basis of rates to one involving values. The great need for a good can opener also came in for some attention. One suggestion, in line with the mechanization of apartment dwellings urges that a power-driven can opener should be a part of the equipment of any up-to-date kitchen. Belief was expressed that the canning industry should control the sale of openers rather than leave it to outsiders.

In reporting on the tangible results of radio broadcasting it was shown that nine weeks' work has brought 50,433 letters to the association. The four broadcasts in the first week brought 11,745 letters, of which only 2 per cent were interested solely in souvenirs. The other 98 per cent wanted facts on canned foods.

One of the interesting facts brought out in the meeting was that fruit and vegetable canners of the country use 4,250,000,000 containers annually.

Herbert Photos, Inc.

Baking for the Bread Line

Proof of the permanence of the Parisian bread line is found in a new bakery, known as the Paris Bakery Assistance, that has lately been opened to provide 10,000 loaves a day for charitable distribution. Discharge end of the oven is shown above.

Plan to Increase Stores In Springfield Test

CREATION of an industry of nation-wide scope is forecast in the recent announcement by C. M. Chester, Jr., president of General Foods Corporation, of preliminary plans for the expansion of Frosted Foods Company, Inc., the subsidiary which controls the Birdseye process for freezing meats, fruits, and vegetables in package form.

"As the first step toward nation-wide distribution, present plans call for the extension of Frosted Foods in the New England territory," said Mr. Chester. "Factory facilities are being expanded to meet the demands of a large number of grocery outlets for quick-frozen perishable foods which will be opened up in that district.

"Experimental shipments abroad have met with great success," said Mr. Chester, "and it is felt that quick-freezing will help solve the problem of transporting perishable foods from one country to another with no loss in quality. Inquiries have been received regarding the new process from representatives of perishable-food industries throughout the United States, Europe, South America, and Australia.

"Several more perishable food products are being added to the present line of meats, fruits, and vegetables. Following the successful two months' experiment in ten Springfield (Mass.) grocery stores, several more stores in that city are being added as outlets."

Engineers Have Dinner Of Frozen Foods

SIX frozen foods were on the menu of the dinner held by the New York Section of the American Society of Refrigerating Engineers at the Hotel Governor Clinton, New York City, on May 21. Figs and cherries from Libby, McNeil & Libby; haddock from Atlantic Coast Fisheries Company; lamb chops from Swift & Company; and peas and corn on the cob from Henry Kelly & Son were consumed with evident enjoyment by the large group who gathered to hear Harden F. Taylor, vice-president of Atlantic Coast Fisheries Company, discuss the scientific aspects of freezing fish.

Dr. Taylor reviewed the work done by early investigators in determining the changes which take place in the cellular structure of the flesh of fish when subjected to freezing. He gave a detailed account of his own work on drip, as reported in his article, "Solving the Problems of Rapid Freezing" in the April, 1930, issue of FOOD INDUSTRIES.

The common theory that damage to the cells is entirely due to a puncturing of the cell walls by pointed ice crystals is not supported by the facts. Under certain conditions, he demonstrated, fish that are rapidly frozen undergo cellular breakdown almost on a par with very slowly frozen samples. This may be prevented, it was pointed out, by use of a processing treatment that alters the *pH* value of the cellular contents. At the isoelectric point, where protein material may act either as an acid or an alkali, colloidal dehydration is at a maximum. By adjusting the *pH* value at a considerable distance from this point, these objectionable changes are kept at a minimum. Even with slow freezing rates, the problem of drip can be controlled by this method, Dr. Taylor maintained. In fact, the fish steaks served at the dinner, regarded by most of those present as products whose quality was due to rapid freezing in the Cooke quick-freezing machine, were frozen in an ordinary sharp freezer, it afterward developed.

One of the major values of a proper freezing time, Dr. Taylor said, is in controlling the color of the products. Freezing too slowly makes the flesh translucent and unappetizing. Freezing too rapidly—something which many have held impossible—makes the product resemble a piece of white marble. The optimum value, he held, gives a natural looking product when frozen.

Following Dr. Taylor's address, a motion picture showing fishing operations was exhibited.

Trade Near Normal

THERE is now little doubt that general business is steadily climbing toward the normal level for the season and the year. The closing week of May finds business operations only slightly more than 1 per cent below normal as compared with the sub-normal operations of almost 12 per cent at the opening of the year, according to *The Business Week*. Current business conditions are good, except when compared with the same time last year, when general business activity was about 10 per cent above the estimated normal.

General manufacturing, as indicated by consumption of electrical energy, appears to be holding at a balance, with no indication of the drop in rate of activity which normally takes place at this season of the year. Operations, however, are still some 12 per cent under this time last year.

Taken as a whole, the food products industry continues to operate on a comparatively high plane. Current operations are about 11 per cent under a month ago, but a decreasing rate of activity is normal for this season of the year. The industry is still operating on about the same plane as last year, while manufacturing in general is at a rate 12 per cent under this time last year. The food products industry is one of the few industrial groups reporting current operations on a level with or better than this time last year.

Flavoring Extract Meeting Considers Trade Relations

WITH the relations of business and government as its central theme, the Flavoring Extract Manufacturers' Association of the United States held its twenty-first annual convention in Washington on May 6, 7, and 8. Addresses by Dr. Hugh T. Baker, of the U. S. Chamber of Commerce, on "Better Business Through Better Trade Relations"; Walter G. Campbell, of the Food, Drug, and Insecticide Administration of the U. S. Department of Agriculture, on the interpretation of the attitude of the regulatory branch of the government; C. V. Concannon, Chief of the Chemical Division of the U. S. Department of Commerce; and Dr. James M. Doran, Commissioner of Prohibition, on the relationship of the prohibition enforcement unit to legitimate users of alcohol, brought to the association a clear understanding of the functions of government in relation to the industry.

Dr. Baker pointed out that the problems of industry can be met legally only through the business set-up of trade associations and indicated a trend toward an industry-wide corporation in many industries which would function somewhat like the Associated Grocery Manufacturers' Association. The necessity of the development of an "industry-consciousness" and of a program for the industry was particularly stressed.

Occasional tirades by "Congressional drys" allege that a great deal of alcohol is diverted from legitimate channels to illegitimate channels. But Dr. Doran emphasized with great vigor the fact that if every industry that used alcohol were to be wiped out instantly, the United States Government would still have a major enforcement problem.

The corrective, rather than punitive, policy of the Food, Drug, and Insecticide Administration was stressed by W. G. Campbell, who showed by his remarks that the attitude of the government on enforcement of food regulations is an attempt to be helpful and to assist manufacturers in avoiding trouble, rather than to secure convictions. In speaking of the new policy of multiple seizures, Mr. Campbell pointed out that there are only four instances in which this action is taken. These are:

1. When there has been added to the food a deleterious ingredient that is harmful to health.

2. When the food is filthy, putrid, or decomposed.

3. Cases when the food is obviously falsely labeled.

4. When, through misrepresentation, the food is unfairly in competition with other foods.

Frank M. Boyles, president of Jack Beverages, Inc., of Brooklyn, a member of the research committee of the association, reported on the comparative strength and value of "ethyl vanillin" and vanillin, stating that "ethyl vanillin" had three and one-half times the flavoring strength of the ordinary vanillin.

Cereal Chemists Convene at Chicago

PAPERS ranging from dissertations on storage conditions of combine-harvester wheat to detailed descriptions of laboratory technique were presented at the sixteenth annual convention of the American Association of Cereal Chemists, held at the Edgewater Beach Hotel, Chicago, during the week of May 5, 1930. One hundred and seventy-five milling scientists and technicians were in attendance.

In his opening address, the convention president, M. A. Gray, of Pillsbury Flour Mills, Minneapolis, Minn., characterized the development of a standardized baking test as one of the most important activities ever undertaken by the association. Work thereon is now sufficiently well advanced to expect its completion within the year. In consequence many addresses throughout the week were more or less definitely associated with this endeavor.

On the topic "Studies on the Qualities of Combined Wheats as Affected by Type of Bin, Moisture, and Temperature Control," a paper by C. O. Swanson, of Kansas State College, Manhattan, Kan. (read by his associate Earl B. Working, by virtue of Dr. Swanson's absence from this country), stated that probably one-half of the wheat grown in the Southwest is harvested with the combine. How to store this wheat so that it will keep sound and be of good quality when milled is a problem under investigation by the Kansas Agricultural Experiment Station.

Eleven bins of approximately 500 bu. capacity were erected at the Fort Hays Experiment Station, in the center of the wheat belt of western Kansas. There were three concrete bins, two wooden, and six steel bins. Two of the latter were very well ventilated, and some had little or none.

The greatest damage occurred in one concrete bin and in one steel bin that had no ventilation. The wheat in these two bins started to heat very soon after binning, and would have been spoiled for milling purposes if it had been left undisturbed.

Wheat stored in the ventilated steel bins kept the best. In one of these the wheat averaged 16 per cent moisture, and in the other a little less. However, the temperature of the wheat was 35 deg. C. when put in, and the wheat had been threshed from the windrow. There was no temperature increase that necessitated moving the wheat. Rancidity and baking tests indicated no damage. Low germination of the wheat in all the bins were noted. When the wheat had suffered considerable damage it was all dead, even wheat of good milling quality having low viability. It seems that the post-ripening process which improves the viability of new wheat did not take place satisfactorily.

C. H. Bailey, of Minneapolis, Minn., and E. G. Bayfield, of the Ohio Experiment Station, in "The Effect of Premature Freezing on Water Imbibing Capacity of Wheat," stated that earlier work on frosted wheat, particularly that conducted at the Montana Agricultural Experiment Station, indicated that the extent of damage as registered in terms of amino nitrogen content, and in baking tests, is determined largely by the moisture content of the grains in the heads before they are frozen.

In connection with the baking test, W. L. Heald, of the Commander Larabee Flour Mills, Kansas City, Mo., reported on standardized laboratory equipment and technique in "Modification of the Swanson Mixer and Its Application to the Standard Baking Test." He told of the making of four series of bakes, two on a Hobart laboratory mixer and two using the Swanson modification.

The series were baked using the tentative method of the American Association of Cereal Chemists, with the exception that mixing was done by machine, with the mixing time varied from 1 to 6 minutes at ½-minute intervals. Four individual loaves were baked on each mixing time. Tables showing the data obtained and curves representing the loaf volume plotted against the mixing time were drawn.

In the judgment of the speaker, the Swanson modification incorporates ingredients more rapidly and more thoroughly than the Hobart, but there is danger of over-mixing and breaking down the gluten by too long mixing with the Swanson modification.

Additional material applicable to laboratory baking tests was furnished by T. R. Aitken, of the Grain Research Laboratory, Board of Grain Commissioners, Winnipeg, Canada, in describing "An Automatic Proofing Device for Bread Doughs." Briefly, bread doughs in the laboratory proofing cabinet carry light, transverse wands that complete an electrical circuit to ring a bell when fermentation is complete.

In "Some Factors of Dough Development," Earl B. Working, of Manhattan, Kan., reminded his audience that bread dough is an exceedingly complex colloid, very sensitive to physical and chemical environment and to time, and containing relatively unstable chemical compounds. Fermentation is influenced by the chemical and physical properties of the dough, in addition to the inherent invariability of a biological process. Among the characteristics determinative of flour qualities as required to various baking purposes, the reaction of a flour to water is a very important factor.

Dr. R. C. Sherwood, General Mills, Inc., of Minneapolis, spoke briefly on "The Testing of New Northwestern Wheat Varieties"; Claude F. Davis, of the Western Star Milling Company, Salina, Kan., told of the co-operation carried on by the cereal chemists in his part of the country; R. J. Clark, of the Schulze Baking Company, Kansas City, Mo., pleaded for one determination only in judging flours; M. J. Blish, of the Nebraska Agricultural College at Lincoln, reported on certain specific details of determining nitrogen by the Kidhdahl and the Gunning methods and of the essential composition of the protein of flour. "The Effect of Variation in Fermentation Temperature on Bread Quality of Doughs Containing Dry Skim Milk" was described by Miss Emily Grewe, of the U. S. Department of Agriculture, Washington, D. C. "The Relation Between Peptization of the Wheat Flour Proteins and the Baking Quality of Hard Red Spring Wheat Flours" was treated by W. F. Geddes, of the department of agriculture, University of Manitoba, Winnipeg, Canada.

A detailed explanation of "The Association of Agricultural Chemists' Gasometric Method for the Determination of Carbon Dioxide in Baking Powder," prepared by Messrs. Chittick, Dunlap and Richards, was given by J. R. Chittick, of the Jaques Manufacturing Company, Chicago. The apparatus demonstrated by Dr. Chittick produces results closely comparable with those obtained by standard laboratory methods as used generally by analytical chemists.

In discussing self-rising flour, Paul Logue and Elizabeth McKim stated that, after an initial loss of 13 to 15 per cent of the available CO_2 during the first 5 weeks, there is little further deterioration, provided the flour is kept at a moisture content of not more than 12.5 per cent.

"The Staling of Bread," by Washington Platt, of the Borden Company, Syracuse, N. Y., was a didactic and highly entertaining demonstration of a device for measuring the compressibility of bread in various stages of freshness; Claude F. Davis, of Salina, Kan., reported on certain "Wheat Protein Test Digestion Studies."

In addition to the formal program, a session on Thursday was given over to an impromptu joint meeting with such bakery engineers as were in attendance, this under the leadership of Louis E. Caster, of Keig-Stevens Baking Company, Rockford, Ill., president of the American Society of Bakery Engineers.

An evening session was devoted to discussion of methods of testing cake and biscuit flour, led by Miss Mary M. Brooke, of Purity Bakeries Corporation, Chicago; an afternoon was spent at the American Institute of Baking, at which was given the report of the committee on the standard baking test, together with a demonstration of equipment.

Cereal Chemists Officers

For the ensuing year the following officers were elected:

President, C. G. Harrel, Commander-Larabee Corp., Minneapolis, Minn.; Vice-President, R. K. Durham, Rodney Milling Co., Kansas City, Mo.; Secretary-Treasurer, Maynard D. Mize, Omaha, Neb., re-elected; Editor of Cereal Chemistry, C. H. Bailey, Minneapolis, Minn.; Managing Editor, R. C. Sherwood, Minneapolis, Minn.

Refrigerating Engineers Hear of Frozen Foods; Discuss Display Cases

ADVANCES in refrigeration practice accompanying the freezing, distribution, and display of frozen foodstuffs were featured at the spring meeting of the American Society of Refrigerating Engineers, held in Atlanta, Ga., May 7 to 9.

Plans for the production of frozen Georgia peaches on an extensive scale were described by W. R. Tucker, agricultural development agent of the Atlanta, Birmingham & Coast Railroad. Sliced peaches packed with sugar are to be quick-frozen in 1-lb. waxed paper containers and then held to supply the "out-of-season," high-quality demand. Actual construction work on the new plant at Montezuma, Ga., will begin in the near future, so that it can be in operation in time to handle this year's crop.

Extensive experiments covering more than two years preceded the plans for large-scale production. Unsatisfactory for canning because of the very delicacy of cellular structure that is their chief asset from a flavor standpoint, Georgia peaches have presented a difficult overproduction problem. Flooding of the market during the brief season in which they reach maturity could be avoided, Mr. Tucker said, by withholding in a frozen condition a sufficiently large part of the crop.

As a result of experiments made last year, the most satisfactory varieties, the proper freezing time, freezing and holding temperatures, and container size have been determined definitely. More than 10,000 lb. of peaches were frozen by Mr. Tucker and his associates at the height of the producing season last year, and stored until Christmas time. Then they were packed in solid carbon dioxide and sent to leading hotels, representative peach growers, home economics bureaus, and other interested individuals. An amazing unanimity of opinion to the effect that these peaches were indistinguishable from freshly picked products resulted from this test. With the plans that have been developed, large-scale production will make it possible to market frozen peaches at a price that is considered reasonable for such high-quality products. It is planned eventually to effect national distribution throughout the period when fresh fruit is not available, Mr. Tucker said.

The Fishing Industry

The relation of refrigeration to the fishing industry was treated in a paper by D. B. Finn, Director, Biological Board of Canada Fisheries Experimental Station, Prince Rupert, B. C. He declared that, although the introduction of quick-freezing methods has done much to improve the quality of fish so preserved, the problems of the industry are by no means solved. "It is one thing," he stated, "to turn out a product that has undergone very little deterioration by the act of freezing, and quite another to maintain this product without deterioration in cold storage." Although the action of autolytic (breakdown) enzymes is greatly retarded by low temperatures, there is evidence that certain enzymes are active at temperatures approximating 10 deg. F., which produce undesirable effects when allowed to proceed over a period of months, Mr. Finn reported.

By equipping fishing vessels with apparatus for freezing, it would be possible to produce a frozen product in many cases vastly superior to the unfrozen fresh fish now marketed. Halibut, often stored in crushed ice from 18 to 25 days before reaching the customer, was cited as an example.

C. T. BAKER
Was in Charge of Arrangements at Atlanta

In conclusion, Mr. Finn prophesied, "there are very good reasons for believing that in the future most of our fish will be processed by modern methods of refrigeration and distributed in a frozen condition."

A paper of considerable interest to manufacturers of frozen foods was presented at the Wednesday morning session by A. H. Cooper, of the University of Tennessee. As the result of a large number of calorimetric tests, further verification was given of the fact that the latent heat of fusion of practically any food can be obtained, for all practical purposes, directly from the percentage of water present. To obtain the latent heat in B.t.u. it is necessary only to multiply the percentage of water by 143.4, the latent heat of fusion of water.

An animated discussion of the merits of display cases for frozen foods followed the presentation of papers prepared by Reuben E. Ottenheimer, Ottenheimer Bros., Baltimore, Md., and G. J. Hopkins, chief engineer, McCray Refrigerator Company, Kendallville, Ind. Mr. Ottenheimer summarized the elements of an ideal display case as follows:

1. It should display the food offered for sale in the most appetite-appealing manner.
2. The size should be economical. An adequate and accessible storage compartment should be provided.
3. Construction must be sufficiently sturdy to withstand the severest test of service.
4. Insulation must represent the maximum of heat-resisting efficiency and protection against moisture infiltration, yet be sufficiently compact to avoid impractical bulkiness.
5. Refrigerating apparatus must be designed to co-ordinate.

"The successful sale of frozen foods must be geared to the reaction of the housewife," he said. "She is the deciding factor as to the ultimate in retail vending equipment. And her acceptance of frozen foods depends entirely upon two points: First, the eye-appeal produced by the attractiveness with which the foods are offered to her, and, second, the condition in which she finds the foods on her table."

"This new use of refrigeration is of such recent development," Mr. Ottenheimer admitted, "that the perfect dispenser for frozen foods has not yet been invented . . ."

Some of the points upon which there is still considerable disagreement, and which will have an important bearing upon the evolution of display cases, were discussed by Mr. Hopkins. They may be summarized as follows:

1. The limits of temperature between which the goods must be kept.
2. The condition of the stock at time of delivery.
3. The intervals between deliveries and, therefore, the quantity delivered in the foregoing condition.
4. Whether the customer will acquiesce in seeing one package in the display section and accepting another from storage.

In regard to the final point, Mr. Hopkins suggested that service be rendered possible directly from display for those customers who require it, and from storage for those who do not.

In the subsequent discussion, problems of insulation and frosting were prominent. A case of new design, in which continuous defrosting of the coils is provided, provoked considerable comment.

Attention was turned to non-freezing requirements of refrigeration practice at the beginning of the Friday morning session, when Tresper Clarke, chemist, Nunnally Candy Company, Atlanta, Ga., told of the scientific application of heat engineering and humidity control to candy manufacture. "In reality," he pointed out, "applied thermodynamic knowledge is the heart of the candy industry and, instead of a heating and cooling system being built into a plant, it is the practice today to build the plant around the system."

A large number of the fallacies that exist concerning air circulation in iced refrigerator cars in which fresh perishables are shipped were exploded by A. J. Lorion, Freight Container Bureau, American Railway Association.

TRADE NOTES

BORDEN COMPANY has acquired 10 more dairy products companies in the last few weeks. They are: J. J. Joubert. Ltd., Montreal, Que.; Halls, Ltd., Lindsay, Ont.; Johnson Dairy Company, Chicago, Ill.; Chillicothe Bottling Company, Chillicothe, Ohio; 85 Jane Street Corporation, New York City; Bagel Brothers Dairy Company, Chicago, Ill.; Lone Star Ice Cream Company, Waco, Texas; Home Dairy, Glens Falls, N. Y.; Huber Ice Cream Company, Bridgeport, Conn.; Purity Ice Cream Company, Waco, Texas.

CO-OPERATIVE PURE MILK ASSOCIATION, Cincinnati, Ohio, has been granted a loan not to exceed $1,900,000 by the Federal Farm Board, it was announced on May 8.

DAIRYMEN'S LEAGUE CO-OPERATIVE ASSOCIATION, INC., New York, has been granted a loan of $4,000,000 by the Federal Farm Board. This is the largest loan granted by the board in the eastern part of the country. The money will enable the association to carry out a 3-year program of expanding its merchandising and handling facilities. Total repayment is required in approximately 10 years.

DRYICE CORPORATION OF AMERICA and the Continental Oil Company have agreed to form a jointly owned company to manufacture solid CO_2 from natural gas obtained near Walden, Jackson County, Colo. The DryIce Corporation will erect a pilot plant to extract hydrocarbons and purify the gas from wells already drilled. The new company will be formed on the basis of results with the pilot plant.

FAY FRUIT COMPANY, Ontario, Calif., suffered the loss of a packing house and its contents of fruit by fire a few weeks ago. The fire is said to have been caused by an exploding oil stove used in connection with the sweating of oranges.

GLIDDEN COMPANY, Cleveland, Ohio, has acquired the margarin business of E. F. Drew & Company. The new department will be combined with Durkee Famous Foods, Inc., a Glidden subsidiary.

KITCHEN PREPARED PRODUCTS, INC., has been formed by the consolidation of three Wisconsin canning companies: The Rock River Canning Company, with plants at Madison and Reeseville; West Bend Packing Company, West Bend; Theresa Canning Company, Theresa.

LANGENDORF-UNITED BAKERIES, INC., San Francisco, Calif., have purchased the Seattle (Wash.) plant of the Davidson Baking Company. A large addition to the plant is contemplated.

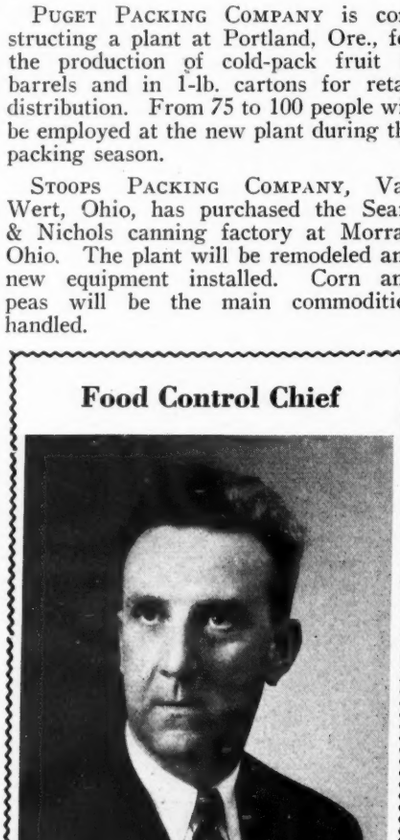
MARTIN PEANUT PRODUCTS CORPORATION, Chicago, Ill., has recently put into operation its new branch plant in Brooklyn, N. Y. The plant will be used exclusively for the manufacture of peanut butter.

NATIONAL BISCUIT COMPANY has announced completion of negotiations for the absorption of the Pacific Coast Biscuit Company. The latter organization had assets of more than $5,800,000 at the end of 1928, with factories in Spokane, Tacoma, and other Western cities.

PUGET PACKING COMPANY is constructing a plant at Portland, Ore., for the production of cold-pack fruit in barrels and in 1-lb. cartons for retail distribution. From 75 to 100 people will be employed at the new plant during the packing season.

STOOPS PACKING COMPANY, Van Wert, Ohio, has purchased the Sears & Nichols canning factory at Morral, Ohio. The plant will be remodeled and new equipment installed. Corn and peas will be the main commodities handled.

Food Control Chief



Ward B. White, formerly director of the New York State Bureau of Chemistry, has accepted the position of chief of food control, Food and Drug Administration, U. S. Department of Agriculture, effective June 2. This appointment is to fill the vacancy caused by the death last autumn of Dr. R. W. Balcom.

Dr. White in his new duties will supervise and direct the scientific and technical work necessary in enforcing the Tea Act, the Import Milk Act, and the Federal Food and Drugs Act as applied to foods. Under his direct supervision will be the entire staff of the food control unit in Washington, composed of chemists, bacteriologists, and food specialists. He will have general direction of and responsibility for the scientific and technical operations of the field force in applying the law to interstate shipments of food products, and will supervise the work involved in the improvement of existing analytical methods and in the development of new methods for the detection of new forms of adulteration.

PERSONALS

C. A. BAUMEN, vice-president and general manager of Durkee Famous Foods, Inc., was elected president of the Institute of Margarine Manufacturers at the annual meeting in Washington, D. C., May 22 and 23. Ways and means of protecting the industry against unfair legislation were considered at the meeting.

HARRY W. BLOCK, formerly with Reid & Carnrick, Jersey City, N. J., is now research chemist with General Foods Corporation, Gloucester, Mass.

R. N. CHAPMAN, head of the department of entomology at University of Minnesota, has accepted a position as director of the experiment station of the Hawaiian Pineapple Canners' Association, Honolulu. He will succeed ARTHUR L. DEAN, who recently resigned this position to become associated with Alexander & Baldwin.

ASHLEY B. CLARK, formerly resident manager of the General Baking Company's plant at Springfield, Mass., has been promoted to the headquarters staff in New York City.

F. O. FOSTER, for the past 15 years manager of the Walker-Gordon Laboratory of the Detroit Creamery Company, has left that company and established an independent buttermilk plant at Royal Oak, Mich., a suburb of Detroit. This buttermilk will be sold in paper bottles.

WALTER K. HINES, formerly assistant operating manager of the Fresno (Calif.) plant of the Sun-Maid Raisin Growers' Association, has been appointed manager of plants, following the resignation of A. V. B. KLEIN. L. M. KILNER has been appointed superintendent of plants 4 and 55, both in Fresno.

H. J. HUMPHREY was recently made superintendent of the Albion (N. Y.) plant of the Snider Packing Corporation. This is the largest factory operated by this company.

L. F. KEDZIE, manager of the Groton (Conn.) division of the Atlantic Coast Fisheries Company, has been placed in charge of the Chicago subsidiary, Robbins, Inc. H. F. ROBINSON, formerly superintendent of the Canso (N. S.) plant, succeeds Mr. Kedzie at Groton.

J. L. KRAFT, chairman of the board of Kraft-Phenix Cheese Corporation; A. A. STICKLER, treasurer of National Dairy; and JOSEPH POTTS were recently elected directors of National Dairy Products Corporation.

FRANK C. LOWRY was recently elected president of Warner Sugar Company. Mr. Lowry and HORACE HAVEMEYER had previously been elected to the board of directors, succeeding GEORGE J. MORROW and MANUEL E. RIONDA.

HUNTER S. MARSTON, president of the Bancamerica - Blair Corporation, has been elected a director and a member of the executive committee of General Foods Corporation. The directorate was recently increased from 15 to 17.

MAX A. MCCALL, for the last 6 years assistant head of the office of cereal crops and diseases in the Bureau of Plant Industry, U. S. Department of Agriculture, has been named principal agronomist, in charge of this office. Mr. McCall has been acting in charge of the office for the last three months.

R. W. MCCREERY, formerly president of the National Coffee Roasters' Association, has joined the Continental Can Company, Inc., where he will specialize in problems connected with vacuum-packed coffee. He will be located at 4622 West North Avenue, Chicago, Ill.

W. F. SANKER, formerly chemist for Reick-McJunkin Dairy Company, has taken a position as production manager and chemist of the Sanitary Milk Company, Beaver Falls, Pa.

PEARL B. SANSON, Yale University, has been named associate professor of foods and nutrition at Iowa State College, effective for the next college year.

LILLIAN B. STORMS has been appointed director of the division of nutrition and education for the Gerber Products division of the Fremont Canning Company, Fremont, Mich. Dr. Storms was formerly director of the home economics department of the American Bottlers of Carbonated Beverages.

O. C. SWANSON, head of the department of milling industry at Kansas State Agricultural College, is now in Europe engaged in a survey of milling practices sponsored by the Bureau of Agricultural Economics, U. S. Department of Agriculture, in co-operation with the Federal Farm Board.

D. TOURTELLOTTE has been selected by the fellowship committee of the Mayonnaise Products Manufacturers' Association as the research fellow to carry on the work on mayonnaise.

V. A. WALTER, formerly plant manager of Carolina Baking Company, Burlington, N. J., is now manager of plant and sales of the Hexter Baking Company.

OBITUARY

CHARLES M. AMS, inventor of the "sanitary can" and president of the Max Ams Company, died May 26 at his home in Pelham, N. Y. Mr. Ams, who was 63, practically revolutionized can construction when he conceived the method of sealing cans with crimped edges rather than with solder. A loosely drawn patent spoiled his chances of maintaining control over this type of construction. Originally he was a manufacturer of tin cans, but more recently he was engaged in the manufacture of can-making machinery. Considerable work in the development of rayon machinery also was carried on at his plant.

FRED E. BEECHER, Chicago, Ill., well-known authority on food colors, died on April 18. Mr. Beecher had been in the employ of the National Aniline & Chemical Company for 25 years.

G. G. FREER, sales manager for the National Biscuit Company in Philadelphia, Pa., dropped dead on the beach at Atlantic City on April 25. He was 50 years old.

BURTON F. HALES, president of the Interstate Malt Company, died suddenly in Chicago on May 16. He was 76 years old, and had been a member of the Chicago Board of Trade for 40 years.

EDWIN W. HISCOX, secretary and treasurer of the International Coffee Company, Inc., New York City, died in New York on April 25 as a result of injuries sustained when he was struck by a taxicab. He was 56 years of age.

THOMAS HOLT, dairy and food commissioner for the State of Connecticut, died on April 29 at Newington, Conn. Mr. Holt was 67 years old, and a former president of the American Association of Dairy, Drug, and Food Officials.

THOMAS O. MULLER, president of the Atlantic Fruit & Sugar Company, died on April 29 at Brooklyn, N. Y. Mr. Muller, who was 47 years old, also was a director of the Cuban Dominican Sugar Company. He had been associated with the Atlantic Fruit Company and its successors since 1905.

CYRUS F. STRICKLER, president of the C. F. & W. H. Strickler Milling Company, Lebanon, Pa., died on May 2 after a long illness. He was 76 years old, and had been in the milling business since boyhood.

New Construction

Bakery—Krug Baking Co., 139-01 95th Ave., Jamaica, N. Y., awarded contract for the construction of a distribution plant, garage and service building at 94th Ave. and 138th Pl. to James Baird, 101 Park Ave., New York. Estimated cost $75,000.

Bakery and Warehouse—Owner, c/o Schein & Levine, 333 Washington St., Boston, Mass., Archts., is having plans prepared for a 1 story, 60 x 100 ft. bakery and warehouse. Estimated cost $40,000.

Bakery—Nonpareil Baking Co., c/o R. S. McIlvaine, 514 West Northern Ave., Pueblo, Colo., awarded contract for the construction of a 2 story bakery at Chester Ave. and East 4th St., to H. O. Schmidt, 849 East Evans Ave., Pueblo. Estimated cost $75,000. Equipment will be required.

Bakery — W. L. Tammell, Harlingen, Tex., plans the construction of a bakery, including 75 ft. traveling oven, etc., on West Harrison St. Estimated cost $300,000. Private plans.

Bakery — Van De Kamps Holland Dutch Bakeries, San Fernando Bldg., Los Angeles, Calif., is having plans prepared for a 2 story, 230 x 280 ft. bakery at Fletcher Dr. and Fernando Rd. Estimated cost $250,000. McCormick Co., 41 Park Row, New York, N. Y., is architect.

Biscuit Factory—Sunland Biscuit Co., 4383 Fruilland Ave., Los Angeles, Calif., awarded contract for a 2 story, 27 x 48 ft. biscuit factory, to W. P. Neil Co., 4814 Loma Vista Ave., Los Angeles. Estimated cost $25,000.

Bottling Plant—Alabama Coca Cola Bottling Co., C. V. Rainwater, Pres., Norris Bldg., Atlanta, Ga., plans the construction of a 2 story bottling plant at Anniston, Ala. Estimated cost $100,000.

Bottling Plant — Coleman & Keating, 112 Sudbury St., Boston, Mass., will soon award contract for a 2 story bottling plant at Columbus Ave. Ext. Estimated cost $50,000. Private plans.

Bottling Plant—L. P. Croce Inc., 930 Summerfield Ave., Asbury Park, N. J., will receive bids about Aug. 1 for the construction of a 1 story bottling plant. Estimated cost $40,000. C. B. Cook, Asbury Park Trust Bldg., Asbury Park, is architect.

Bottling Plant — Lovers Leap Beverage Co., 140 Linwood St., Lynn, Mass., awarded contract for a 1 story, 65 x 125 ft. bottling plant on Cliff St. to M. L. Ryan, 8 Fuller St., Lynn. Estimated cost $40,000.

Bottling Plant — Owner, c/o Miller & Levi, 46 Cornhill, Boston, Mass., Archts., will soon award contract for a 1 and 2 story, 100 x 195 ft. bottling plant at Amory St. and Columbus Ave. Estimated cost $140,000.

Bottling Plant—West Point Bottling Works, C. C. Clark, West Point, Miss., is having preliminary sketches made for the construction of a 1 story bottling plant. Estimated cost $15,000. P. J. Krouse, 505 M. & W. Bldg., Meridian, is architect.

Soda Water Plant—New Bedford Bottling Co., 32 Morton Court, New Bedford, Mass., awarded contract for a 2 story soda water plant to H. Desautels, 933 Brook Ave., New Bedford. Estimated cost $40,000 to $50,000.

Canning Plant — Florida Indian River Canning Co., Fort Pierce, Fla., plans the construction of a 1 and 2 story, 75 x 180 and 50 x 75 ft. canning plant. Estimated cost $50,000.

Canning Plant—Pleasant Grove Canning Co., C. L. Wright, Mgr., Pleasant Grove, Utah, plans extensions and improvements to canning plant. Estimated cost $25,000.

Canning Plant—G. W. Wilson Co., Blue Star St., San Antonio, Tex., plans the construction of a fruit and vegetable canning plant. Estimated cost $30,000. Spillman & Spillman, Alamo National Bank Bldg., San Antonio, are architects. Machinery and equipment will be required.

Canning Plant (Tomato)—Libby, McNeill & Libby, L. J. Taylor, Mgr., Chatham, Ont., has work under way on a 1 story, 100 x 100 ft. tomato canning plant. Additional machinery and equipment will be installed.

Canning Plant Addition—B. Jasperon, Kingsville, Ont., will build a 1 story, 28 x 211 and 66 x 90 ft. addition to canning plant. Estimated cost $75,000. Work will be done by day labor. Canadian Canners Ltd., Hughson St. S., Hamilton, is lessee.

Canning and Packing Plant—Cutler-Lobinger Packing Co., Ontario, Calif., awarded contract for a 1 story, 250 x 460 ft. canning and packing plant on 57th Ave., Oakland, to The Austin Co. of California, 1924 Broadway, Oakland. $400,000.

Creamery — Challenge Creamery & Butter Assn., 807 Montgomery St., San Francisco, Calif., is having plans prepared for a 2 story creamery at 18th and York Sts. Estimated cost to exceed $40,000. D. Reidy, Pacific Bldg., San Francisco, is architect.

Creamery—Darigold Milk Co. Ltd., c/o G. H. Wendt, 2116 Allston Way, Berkeley, Calif., Contr., will build a 2 story creamery at 14th St. and 19th Ave., Oakland. Estimated cost $45,000.

Creamery—Hester Dairy, 785 Newhall St., San Jose, Calif., awarded contract for the construction of a 1 story creamery at San Jose and San Carlos Sts. to J. C. Thorp, San Jose. Estimated cost $25,242.

Creamery — Jersey Farm Creamery, c/o E. Cavasso, 235 3rd Ave., San Mateo, Calif., is having plans prepared for a 1 story creamery at Bayshore Highway. Estimated cost $40,000.

Dairy Plant—Hazel Glen Milk Co., C. E. Hastie, 5011 Second Ave., Pittsburgh, Pa., will

soon award contract for a 2 story, 50 x 100 ft. dairy plant. R. O. Coughenour, 4607 Chatsworth St., Pittsburh, is architect.

Dairy Plant — Home Dairy Co., 319 South Washintgon Ave., Lansing, Mich., awarded contract for superstructure of a 3 story, 100 x 150 ft. dairy plant to H. G. Christman Lansing Co., Porter Apts., Lansing. Estimated cost $150,000.

Dairy Plant—Standard Dairy Co., 26 Blackstone St., Cambridge, Mass., awarded contract for the construction of a 1 story factory at 30 Blackstone St., to C. A. Dodge Co., Erie St., Cambridge. Estimated cost $40,000.

Dairy Plant—Willowbrook Dairy, 19th and Telegraph Ave., Oakland, Calif., awarded contract for a 1 and 2 story dairy plant at San Pablo Ave. and Athens St. to E. S. Campomenosi, 6401 Broadway, Oakland. Estimated cost $65,000.

Dairy Products Plant — E. S. Trask, Idaho Falls, Idaho, is having preliminary plans prepared for the construction of an 80 x 160 ft. dairy products plant. Estimated cost $80,000.

Ice Cream Plant Equipment—Borden Farm Products Co. Inc., 110 Hudson St., New York, N. Y., acquired plants of Lone Star Ice Cream Co. and Purity Cream Plant at Waco, Tex. Plants will merge and complete new equipment will be purchased and installed. Estimated cost $75,000. Private plans. Also plans a 1 story, 40 x 150 ft. ice manufacturing plant on 20th Ave., Los Angeles, Calif.

Milk Distribution Plant—Sheffield Farms Inc., 524 West 57th St., New York, N. Y., plans the construction of a 125 x 150 ft. milk distribution plant at Westmoreland Ave. and Home St. $100,000. Also 6 story plant at Fulton St. and New York Ave., Brooklyn, $150,000; soon award contract for alterations and additions to distribution station including loading platform at Teaneck, N. J., $100,000.

Pasteurizing Plant — Lauderdale Dairies, Meridian, Miss., plans the construction of a 1 story, 60 x 60 ft. pasteurizing plant. Estimated cost $35,000. P. J. Krouse, 505 M. & W. Bldg., Meridian, is architect.

Cheese Plant — Kraft-Phoenix Cheese Corp., 400 Rush St., Chicago, Ill., will build a 3 story 66 x 141 ft. cheese plant at Fair St., Atlanta, Ga. Private plans. Work will be done by day labor and sub-contracts. Also plans a 2 story plant at Greenwood, S. C. $40,000. F. P. Shaw, Greenwood, Supt. of Construction.

Cold Storage Plant—City Ice & Fuel Co., 6611 Euclid Ave., Cleveland, O., is having plans prepared for the construction of a cold storage plant at Penn and Pike Sts., Pittsburgh, Pa. Estimated cost $2,500,000. Ball Ice Machine Co., 126 Chout St., St. Louis, Mo., is architect.

Cold Storage Warehouse — Scobey Fireproof Storage Co., 315 North Medina St., San Antonio, Tex., awarded contract for a 4 story cold storage plant to McKenzie Construction Co., Travis Bldg., San Antonio. Estimated cost $200,000.

Ice and Cold Storage Plant—Imperial Ice & Development Co., Coachella, Calif., awarded contract for the construction of an ice and cold storage plant to Gay Engineering Corp., 2650 Santa Fe Ave., Los Angeles. Estimated cost $100,000.

Ice Houses — Bd. Selectmen, B. E. Bourne, Chn., Bourne, Mass., is having plans prepared for two 1 story ice houses on shore on Nightingale Pond. Estimated cost $50,000. Private plans.

Ice Plant—P. O. Denham, 701 North Western Ave., Oklahoma City, Okla., is having preliminary plans prepared for the construction of a 30 ton raw water ice plant. Estimated cost $50,000. Private plans.

Ice Plant—Ice Pool, Greenville, Tex., awarded contract for the construction of a 1 story, 60 x 75 ft. ice plant at 300 West Houston St., Sherman, to C. C. Mayhew and J. A. Ladd, Sherman. Estimated cost $60,000.

Ice Plant and Canning Plant—Rio Hondo Ice Co., c/o G. Fisher, Leavenworth, Kan., and Rio Hondo, will soon award contract for the construction of a 30 ton ice plant, $35,000, also 2 story vegetable canning plant at Rio Hondo. Private plans. Machinery and equipment for canning plant will be required.

Flour Mill—Kerr, Gifford & Co., Inc., Lewis Bldg., Portland, Ore., is having plans prepared for the construction of a flour mill, 4,000 bbl. daily capacity at Willamette Rd. Estimated cost $600,000.

Flour Mill—Sperry Flour Mills, H. P. Iverson, Mgr., Ogden, Utah, awarded contract for a 5 story, 90 x 144 ft. additional unit to flour mill, to C. F. Dinsmore & Co., Ogden. Estimated cost $125,000.

Grain Elevator—Cameron County Navigation Dist. 14, Brownsville, Tex., bond election May 29 to vote $1,500,000 for the construction of a grain elevator, wharf, dock, warehouse, etc. W. E. Anderson, Brownsville, is engineer.

Grain Elevator—Canada Starch Co., 637 Craig St. W., Montreal, Que., awarded contract for a grain elevator at Cardinal, Ont., to MacDonald Engineering Co., Canadian Pacific Bldg., Toronto. Estimated cost $150,000.

Grain Elevator — City, J. H. Burgard, Chn. Dock Comn., Portland, Ore., is having plans prepared for the construction of a grain elevator on Willamette Rd.

Grain Elevator — Co-Operative Equity Exchange, Cimarron, Kan., awarded contract for the construction of a grain elevator, 100,000 bu. capacity to Industrial Engineering Co., 620 Kansas City Life Bldg., Kansas City, Mo. Estimated cost $45,000.

Grain Elevator—Dept. of Railways & Canals, Ottawa, Ont., awarded contract for the construction of a grain elevator, 2,500,000 bu. capacity at Churchill, Man., to Carter-Halls-Aldinger Co., Royal Bank Bldg., Winnipeg, Man. Estimated cost $2,115,529.

Grain Elevator—Farmers Grain Elevator Co., Haggard, Kan., awarded contract for the construction of a grain elevator, 65,000 bu. capacity to Chalmers & Borton, 620 Pioneer Trust Bldg., Kansas City, Mo.

Grain Elevator — Albert Pacific Grain Co., Bawlf, Alta., plans the construction of a grain elevator. Estimated cost $50,000.

Grain Elevator—Sullivan Grain Co., Ulysses, Kan., awarded contract for the construction of a grain elevator and head house, 250,000 bu. capacity, to Industrial Engineering Co., 620 Kansas City Life Bldg., Kansas City, Mo.

Grain Elevator Addition—Wichita Public Elevator Co., c/o S. Wallingford, 501 Wheeler-Kelley-Hagny Bldg., Wichita, Kan., awarded contract for addition to grain elevator, including 20 cylindrical tanks, 97 ft. high and 18 ft. in diameter, at 30th and Santa Fe Sts., to J. F. McDowell Engineering Co., Denver, Colo. Estimated cost $100,000.

Grain Elevators—Canadian Terminals System, 34 King St. E., Toronto, Ont., plans the construction of a grain elevator, 2,500,000 bu. capacity. $1,500,000. Conveying and grain handling equipment will be required. Also plans grain elevator at Owen Sound, $250,000; a grain elevator, 2,500,000 bu. capacity on Calaraqui Bay, Kingston, $2,000,000.

Grain Elevators — Farmers Union Terminal Assn., M. W. Thatcher, Gen. Mgr., 418 Guardian Life Bldg., St. Paul, Minn., will build four grain elevators, 500,000 bu. capacity each at Williston, Minot, Fargo, and Fairmount, N. D. Estimated cost $50,000 each. Also two grain elevators, 1,000,000 bu. each at Bismarck and Jamestown, N. D., $100,000 each. Work will be done by day labor.

Shredded Wheat Plant — Williams Shredded Wheat Co., 525 Market St., San Francisco, Calif., is having preliminary plans prepared for a 1 and 2 story, 100 x 100 ft. factory at Belmont. Estimated cost $100,000. W. Falch, Hearst Bldg., San Francisco, is architect.

Macaroni Factory — Savoia Macaroni Mfg. Co., 1535 63rd St., Brooklyn, N. Y., awarded contract for the construction of a macaroni factory at 63rd St. and 15th Ave., to John Gamato, 1535 63rd St., Brooklyn. Estimated cost $100,000.

Market and Storage Building — Buffalo Produce Exchange, 162 Perry St., Buffalo, N. Y., will soon award contract for the construction of produce terminal market building at Clinton St. and Bailey Ave. Estimated cost to exceed $1,000,000.

Grocery Warehouse and Cold Storage Plant—The Great Atlantic & Pacific Tea Co., Spring Grove Ave., Cincinnati, O., awarded contract for a 3 and 4 story, 150 x 400 ft. warehouse on Fredonia St., to Ferro Concrete Co., Third and Elm Sts., Cincinnati. Estimated cost $200,000; also bids about Aug. 1 for the construction of a cold storage plant at Buffalo, N. Y.

Produce Warehouse—F. Hillsmith Co., Inc., Winters National Bank Bldg., Dayton, O., will build a produce warehouse and office on 43rd St., Pittsburgh, Pa. Estimated cost $150,000. Work will be done by separate contracts. The Great Atlantic & Pacific Tea Co., Grant Bldg., Pittsburgh, is lessee.

Produce and Express Building—Baltimore & Ohio R.R., Baltimore and Charles Sts., Baltimore, Md., received lowest bid for a 2 story, 140 x 908 ft. produce and express building at Camden, Howard and Sharp Sts., from Frainie Bros. and Haigley, 19 West Franklin St., Baltimore. $500,000.

Produce Plants and Packing House—Swift & Co., 33 South Clark St., Chicago, Ill., plans the construction of a produce plant at Ardmore, Okla., also produce plant and packing house at Denver, Colo. let contract for wholesale meat storage plant including insulation for cold storage at Lubbock, Tex., to G. Sampson Construction Co., Lubbock, $30,000; reconstruction of packing plant at Montgomery, Ala. $100,000 and branch distribution plant at Birmingham, Ala. $100,000.

Curing and Packing Plant—General Seafoods Corp., Gaspe, Que., plans the construction of a curing and packing plant.

Packing Plant — Emge Packing Co., Fort Branch, Ind., awarded contract for a 4 story, 50 x 60 ft. packing plant including cold storage doors, etc. to C. Kanzler, 508 Furn. Bldg., Evansville. Estimated cost $60,000.

Packing Plant — S. A. Gerrard Co., Coloma St., Placerville, Calif., awarded contract for the construction of a 1 story packing plant to W. Campbell Construction Co., 800 R St., Sacramento. Estimated cost $20,000.

Packing House—Gregg, Maxey & Associates, Lakemont, Fla., will soon award contract for rebuilding packing house, also plans a 120 x 160 ft. plant at Avon Park. Estimated cost $100,000 and $50,000 respectively.

Packing Plant — Seaboard Air Line R.R., Savannah, Ga., will soon award contract for the construction of a packing plant at Clearwater, Fla. Estimated cost $35,000. W. D. Faucette, Savannah, is chief engineer.

Packing Plant — Val Decker Packing Co., Piqua, O., awarded contract for a 3 story, 121 x 190 ft. packing plant to Green & Sawyer, Lima. Estimated cost $125,000.

Packing Plant—F. G. Vogt & Sons, Inc., 30th and Race Sts., Philadelphia, Pa., awarded contract for the construction of a 4 story, 112 x 255 ft. packing plant at 36th and Grays Ferry Rd., to William Steele & Sons, 124 North 15th St., Philadelphia.

Packing Plant (Citrus Fruit) — Arizona Growers Assn., Phoenix, Ariz., c/o I. de R. Miller, Mesa, is having preliminary plans prepared for the construction of a 1 story, 135 x 287 ft. citrus fruit packing plant. Estimated cost $75,000.

Packing Plant (Citrus)—W. Ball, Weslaco, Tex., will soon award contract for the construction of a 2 story citrus packing plant. Estimated cost $25,000. Private plans. Machinery and equipment will be required.

Packing Plant (Citrus) — De Soto Packing Co., De Soto, Fla., is having plans prepared for the construction of a 1 story, 100 x 140 ft. citrus packing plant. Estimated cost $25,000.

Packing Plant (Citrus) — Lake Hamilton Citrus Growers Assn., c/o L. Anderson, Mgr., Lake Hamilton, Fla., is having revised plans prepared for a 1 story, 102 x 163 ft. packing plant. Estimated cost $40,000.

Packing Plant (Citrus)—Lake Placid Citrus Exchange, c/o O. F. Gardner, Pres., Lake Placid, Fla., plans the construction of a 1 story packing plant. Estimated cost $25,000.

Packing Plant (Fruit)—Hood River Packing Assn., Hood River, Ore., awarded contract for the construction of a 4 story, 188 x 200 ft. fruit packing plant to L. C. Baldwin, Hood River. $58,495. Boilers, engines, fruit washing, grading, packing and cooling apparatus will be installed.

Warehouse—Pennsylvania R.R. Union Station, Pittsburgh, Pa., awarded contract for a 1 story, 100 x 324 ft. fresh fruit warehouse including loading platforms at 16th and Pike Sts. to W. F. Trimble & Sons, 1719 Pennsylvania Ave. N. S., Pittsburgh. Estimated cost $225,000.

Packing Plant — West Philadelphia Stock Yards Co., Race St., Philadelphia, Pa., awarded contract for the construction of a 6 story, 147 x 254 ft. abbatoir building and office at 36th and Greys Ferry Rd. to Turner Engineering Co., 1700 Walnut St., Philadelphia. Estimated cost $1,000,000.

Packing Plant (Poultry and Slaughter House)—J. H. Berman Co., West 17th, Neptune Ave., Van Dam St. and Ave. N., Brooklyn, N. Y., will award contract in Spring of 1931 for the construction of a poultry packing plant and slaughter house. Estimated cost $40,000. Delayed by action of Bd. of Standards & Appeals on permit.

Poultry Warehouse—Utah Poultry Producers Co-Operative Association, c/o C. C. Edmonds, Mgr., Salt Lake City, Utah, awarded contract for the construction of a 3 and 5 story, 75 x 200 ft. warehouse to Cherdron Construction Co., McIntyre Bldg., Salt Lake City. Estimated cost $225,000. Machinery, equipment and refrigeration to be awarded later.

Sheep Shed—Ogden Union Stockyards, L. E. Whitlock, Mgr., Ogden, Utah, is having preliminary plans prepared for the construction of a sheep shed, 10,000 to 12,000 capacity. Estimated cost $100,000.

Stockyard Building — Union Stockyards of Toronto, Ltd., St. Clair Ave. W., Toronto, Ont., awarded contract for the construction of a stockyard building to Sullivan & Fried, 81 Victoria St., Toronto. Estimated cost $200,000. Also plans 2 story, 240 x 380 ft. pen house. $175,000.